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THE CANADIAN

ENTOMOLOGIST.

VOLUME XXVI.

EDITED BY THE

Rev. C. J. S. Bethune, M. A., D. C. L.,

PORT HOPE, ONTARIO.

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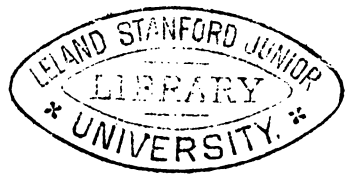

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Canadian Entomologist.

LONDON, JANUARY, 1894. No. 1.

OUR QUARTER CENTENARY.

How swift the flight of time appears—
As t'were but yesterday
A fourth part of an hundred years
Has winged its course away!

Though all these years our folded page
Has monthly shown its face;
How many moons of science sage
Succeeding in the race!

The story that we had to tell
Of bee and butterfly,
The story—have we told it well,
With love and earnestly?

How with the lapse of years, how small
Do all our quarrels seem!
Like children's play, or like the fall
Of shadows on a stream!

The story of the spider's nest,
Of beetles, black or gray,
Is it a story, at the best,
Told by ephemera!

Or is it the *pursuit* of truth
Where all the pleasure lies,
Perfect knowledge—*that*, in sooth
Is hidden from our eyes.

Yet in this quest our little barque
Has bravely held its way,
Aboard a crew of men of mark
As e'er sailed for Cathay;

And all our volumes, as they lie,
Came ever opportune,
Thanks to the patient industry
Of Saunders and Bethune!

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January, 1894 A. R. GROTE.

1894.

With the December number, the CANADIAN ENTOMOLOGIST completed its twenty-fifth volume. The Council of the Entomological Society of Ontario have endeavored to make it as useful as possible to the working entomologists of North America. The publications of our Society consist chiefly of the ANNUAL REPORT published by the Hon. Minister of Agriculture and Arts of Ontario, in his annual report to the Legislature, and the monthly magazine, the CANADIAN ENTOMOLOGIST. The former of these is devoted particularly to papers of economic interest, and is distributed not only to our own members, but to every member of the Fruit Growers' Association of Ontario, to members of Parliament, the Mechanics' Institutes, etc., making an issue of about 6,000 copies. The CANADIAN ENTOMOLOGIST is published periodically, so as to give an opportunity to authors to describe new species and to record observations of scientific interest. In starting a new volume, the Editor and Council desire to thank their many eminent and sympathetic contributors for their valuable assistance in the past, and trust that by careful attention to their wishes and prompt publication of their articles they will be able not only to keep up the standard of excellence and popularity to which the magazine has attained, but to show every entomologist on the continent that the CANADIAN ENTOMOLOGIST is indispensable, if he wishes to keep in touch with what is going on in connection with his studies. The Council presents herewith, as a frontispiece to the new volume, a likeness of the Rev. C. J. S. Bethune, who for so many years and so acceptably has edited this magazine. They feel sure that contributors and readers who have not had the pleasure of meeting Dr. Bethune will be as much pleased to receive his likeness as a New Year's card from the Council, as we know those will be who have made his personal acquaintance and experienced his genial courtesy as editor.

W. H. HARRINGTON,
President of the Entomological Society of Ontario.

DESCRIPTION OF THE PREPARATORY STAGES OF PHYCIODES CARLOTA, REAKIRT (CHARIDRYAS ISMERIA, SCUDDER).

BY WM. H. EDWARDS, COALBURGH, WEST VA.

EGG.—Pear-shaped, broad at base and rounded, tapering rapidly to a small, slightly depressed, truncated summit; marked by about twenty-four low, vertical, not sharply defined ribs, which extend a little more than half way from the top to base, but vary in individuals; below the ribs to base thickly covered with shallow and irregular (both as to size and shape) indentations, not separated by definite ridges or threads; colour, when laid, pale green. Duration of this stage, nine days.

YOUNG LARVA.—Length, at one day from the egg, .08 m.; cylindrical, even, each segment rounded, with black hairs or processes rising from concolored minute tubercles, arranged as in *Tharos* and *Nycteis;* colour green with a tint of brown; head scarcely broader than 2; obovoid, bilobed, black-brown, with many short and curved black hairs over the face. Duration of this stage, between two and three days.

After first moult: length, at one day, .12-inch; each segment rounded; colour variable, either dark-brown altogether, or light yellow-brown with a darker sub-dorsal stripe; under side, feet and legs, yellow-brown; armed with spines as in the genus, these being small, conical, shining black, with black bristles about the sides, and one larger at the top; head nearly as before. Duration of this stage, three days.

After second moult: length, at one day, .18 to .20 inch; shape as before, the spines somewhat longer in proportion; colour variable, some being wholly yellow-brown, some light-brown (not so yellow), and both these types sometimes have a dark-brown sub-dorsal stripe; some are all dull green, and some are pale black, a little mottled with gray; the spines are black and rise from small shining black tubercles; head as before. To next stage, from two to three days.

After third moult: length, at one day, .3 inch; same shape; the lower lateral spines brown-yellow, the upper rows black, and in shape as before; colour variable, some being light yellow-brown, with a dark sub-dorsal stripe, some brown-black, with a patch or red-fulvous on dorsum of 2; others have a mid-dorsal row of such patches, one to each segment; others are reddish-brown; in all the lower half of the side is different from the upper part, being either greenish-brown, mottled more or less with whitish, or light brown and so mottled, but without green; head as before.

About two-thirds of the larvæ in July, and all in August and September, went into lethargy immediately after third moult, shrinking to the length of .24 and even to .2-inch, and becoming wider in the middle ; the rows of spines were brought close together, with no visible interspaces. But a few of the larvæ in July went on to fourth moult and pupation. With these the duration of the stage was about three days.

After fourth moult : length, .5 inch ; of three larvæ, all were black, with red-fulvous dorsal band. Probably in a large number the colours would be quite as variable as after third moult.

MATURE LARVA.—Length, .8 inch. Colour (of three examples under view), deep black, specked with white or yellow-white ; a red-fulvous mid-dorsal band from 2 to 13, sometimes widening on 2, interrupted by the tubercles after 4 ; along the lower half of side the black ground is much mottled with white, so as to have the effect of a white band, and on either edge is a macular white line, most complete on the upper ; the spines, as in the genus, rising from shining black tubercles, and are concolored with them, tapering to a blunt point, out of which springs a straight short bristle, and there are many such about the sides from top to base ; under side gray-brown ; the feet black, pro-legs gray-brown ; head obovoid, bi-lobed, shining black, with many short curved-down black hairs from black tubercles. From fourth moult to pupation about six days.

CHRYSALIS.—Length, .54 inch ; shape of *Tharos*, and resembling that species at all points ; head case narrow, excavated at the sides, nearly square at top, a very little depressed ; mesonotum rather prominent, not carinated, the summit rounded, the sides a little incurved ; followed by a shallow depression ; the abdominal segments somewhat raised anteriorly and compressed into a low and narrow transverse ridge, which reaches from one sub-dorsal tubercle to its fellow, but on 6 and 7 extends one tubercle farther ; in all, the five upper rows of tubercles of the larva are here reproduced, low, conical, buff ; general colour white, with pale black markings, specks, and abbreviated lines, so that the effect is gray, or pepper and salt, over the entire dorsal area and the abdomen ; but the wing cases have a tint of brown ; across these last an extra discal, sinuous row of seven clear white dots ; the antennal cases blackish, with many dull white cross bars. Duration of this stage, eight days.

Considering what a common species CARLOTA is over at least one-third of the territory of the United States, it is remarkable that so little has been published respecting it. M. Scudder, Butt. N. E., p. 1811, says :

"This butterfly (*Ismeria*) is found over a wide extent of territory, being known south of lat. 40° from the Atlantic to the Rocky Mountains, and at the higher levels of the west, even into the heart of Colorado, and as far north as Montana, and, according to Geddes, at Brandon, Manitoba. Little is known of its history, or how many broods there are, or how it passes the winter . . . . It awaits a biographer." French, Butt., p. 175, gives as its habitat, "Southern and Western States, Rocky Mountains, Montana to Arizona, occasionly in West Virginia." Mr. T. L. Mead, Wheeler Report, 1875, p. 763, says: "Not uncommon at the lower levels and at Denver. Females much worn were taken early in June, so it is probable that the species appears about the first of May, though somewhat later in the mountains."

Mr. Bruce writes:—"*Carlota* is common in every part of Colorado that I have visited, and in the eastern part of the State is particularly abundant up to about 8,000 feet altitude. At and near Denver it flies early in May and again in midsummer. There are also a few individuals in September, a partial brood. In July, it may be seen near the foothills and in neglected clearings on flowers, the many species of Erigeron being the favourites. The disks of these flowers will be hidden by the many *Carlota* and with them *P. Camillus*. It collects in immense swarms in certain damp places, such as where a stream has overflowed and left the ground in that condition. Larvæ of all sizes can be found almost all summer in great numbers upon the leaves of the foodplants. I have sometimes seen hundreds of them running along the railway track in search of food, having eaten every leaf from the patch of sunflowers where the eggs had been deposited, at the edge of the prairies and along the various cañons and gulches." But Mr. H. W. Nash, at Pueblo, writes me he has rarely seen this species there.

I have never seen this butterfly on the wing but once, and that was at Coalburgh, May 3, 1878, when a fresh male was taken near my house. On 17th July, 1867, another was taken here by a visitor. Mr. A. D. Hopkins, of the West Virginia Agricultural Station, at Morgantown, writes me that on July 8th, 1890, he found *Carlota* abundant in Upshur Co., on the summit of Stone Coal Mountain, flying in the road and in damp places on the road.

The single mention in books of any of the early stages is by Mr. Dyar, CAN. ENT., XXV., p. 93, 1893, who briefly describes an adult larva found

by him in Colorado, apparently after it had changed colour for pupation ; he also describes the pupa from it, but unfortunately gives no feature whatever by which a pupa could be identified or determined.

Mr. Scudder assumes that *Ismeria*, B. & L., is the same species as *Carlota*, and gives that name priority. No one would ever know it from either the description or Boisduval's plate (A. D. 1833). In Butt. N. E., the description of larva and chrysalis is translated thus : Adult larva "yellow, with blackish spines and three longitudinal stripes (of blackish) ; the thoracic legs and ventral surface black, the other legs yellow." The chrysalis : "ashen gray, with some paler light spots and little dorsal tubercles nearly white." This description of the larva has no application to *Carlota*, and that of the chrysalis is too indefinite for identification. The figures of both are wholly out of drawing, and of the insects so barred and striped and spotted as to be unrecognizable. I had a copy of the book, and Mr. Reakirt had access to one, but to neither of us did it occur that *Ismeria* was what was called *Carlota*. It appears that Mr. Scudder, some years after the date of Reakirt's name, saw certain unpublished drawings by Abbot, in the British Museum, among which was *Ismeria*. Boisduval credits Abbot. Now, many of Abbot's figures, especially of larvæ and pupæ, are bad as can be, and where Boisduval has copied them there is no improvement on the original. Whether it is a true copy or not, Boisduval's figures of *Ismeria* do not represent *Carlota*, and by comparing the description with the figures it is plain that it has been drawn from the plate and not from nature. It fits no American butterfly. Consequently, the name *Ismeria* has been rejected by every American lepidopterist, so far as I know, except Mr. Scudder, and the species is known as *Carlota*. It is right that any species so figured and described should have no standing.

It will be seen that the egg of *Carlota* is closely like that of *Tharos*, built on the same plan, same shape, same ribs, though they are more numerous, (about twenty-four in *Carlota* to about fifteen in *Tharos*), same thimble-like depressions below the ribs. It differs somewhat from the egg of *Nycteis*, which is taller in proportion to its breadth, and which shows the depressions for a space below the ribs, while the lower part is smooth. The young larvæ of all three species are alike in shape and armature. The adult *Carlota* is more like *Nycteis* in one respect, namely, that its pines are larger in proportion than those of *Tharos*. I discern no other

difference. In the chrysalis *Carlota* is like *Tharos*, and differs much from *Nycteis*, which is built on the plan of *Phaeton* and the true Melitæas. In habits, all three are essentially alike. I should put *Thraos* and *Batesii*, with *Camillus*, *Picta*, and other western species in one group. *Carlota* in the next, and *Nycteis* in the third, of the genus Phyciodes.

I first received larvæ of *Carlota* on the 15th of July, 1893, from Mr. Charles A. Wiley, of Miles City, Montana, about a dozen, past second and third moults, found on sunflower. On 24th, one larva pupated, on 28th another, and a third adult was put in alcohol. The rest of this lot went into hibernation immediately after third moult, gathering in clusters on a leaf, on a slight bed of spun silk.

On 10th August, I received another invoice of larvæ in younger stages from Mr. Wiley, after first and second moults. All these hibernated after third moult.

On Sept. 8th, came a cluster of about seventy-five eggs, from Mr. Gillette, at Fort Collins, Colorado, laid by a female confined on leaf of Iva Xanthifolia, 2nd Sept. Mr. Gillette informed me that at the same date full-grown larvæ were abundant on same plant and also Helianthus annuus. These eggs were laid three deep, the bottom layer in rows of nine eggs each, standing on their bases and close together; the next layer consisted of about a dozen, laid mostly on their sides, and the third layer of three or four only. These eggs hatched, Sept. 11th, or after nine days. Mrs. Peart compared these eggs with eggs of Synchloe *Lacinia*, which we had at the same time, and wrote me: "There is very little difference between the two, about the same number of ribs (24), which reach a little more than half way the length of sides, not so much as two-thirds, but variable as to length; the indentations below the ribs shallow and irregular, the meshes between the indentations not sharply defined; the same is true of the ribs also; the tops of both are very little depressed, but *Carlota* is of lesser diameter." These larvæ went on to third moult, passing each moult the same day. I noticed the habit they had when alarmed of swaying the anterior half (or more) of the body from side to side, all moving together, and just as may be seen in larvæ of Melitæa *Phaeton* and other species of that genus. Almost at once after passing the third moult, 20th September, they gathered in clusters on the side of the box or on the leaves, shrunk up

and slept. This is like the behaviour of *Nycteis*, as related by me in CAN. ENT., XI., 102, 1879, only that *Nycteis* hibernated after second moult, instead of third. In *Nycteis* (p. 104, l. c.), of 92 larvæ of the June brood, 32 or about one-third hibernated, while the rest went on to pupation. Of 11 *Carlota*, from Montana, of July brood (probably the first brood), about two-thirds hibernated; of the August brood (probably the second), all hibernated. The larvæ from Colorado, of September (the last brood of the year), all hibernated. As fresh examples were taken at Coalburgh 3rd May and 17th July, there is evidence of two broods at least.

I gave these larvæ leaves of Actinomeris squarosa, the food of *Nycteis*, and of the Aster, the food of *Tharos*, but they refused both and fed only on sunflower.

NOTE ON COPIDRYAS PLATENSIS.

BY A. R. GROTE, A. M.

I have suggested in "Papilio" that this South American species belongs to *Copidryas*, and is congeneric with our *C. Gloveri*. Berg's original description says of the frontal structure :—"Fronte valde prominenti, supra cornu complanato depressione declivi marginata fusca ornata." This character agrees well with *Copidryas*, but not with *Eudryas*, in which latter the front is not horned.

Of the colours of *Platensis*, Berg says, the hind-wings are ochraceous with broad and even pale fuscous marginal band, and compares the ornamentation with that of *unio*. There can thus be no shadow of doubt that my *E. cypris*, with its vermilion red unbanded secondaries and related to *E. grata* rather than to *unio*, is specificially and generically distinct. Berg uses *Euthisanotia* instead of *Eudryas*. Hubner's genus has mixed contents, and so far as I can see, from what literary material I have at hand, Boisduval was justified, in 1836, in proposing a new generic title for *grata* and *unio*.

Eudryas cypris, from Paraguay, is allied very clearly to our North American *E. grata;* it is perhaps a still handsomer species from the red colour of hind-wings and under surface. The *Eudriinæ* are generally quite pretty moths, while I think the palm for beauty must lie between *Eudryas cypris* and our North Am. *Ciris Wilsoni*.

AN ENTOMOLOGICAL TRIP TO COPPER CLIFF, ONT.

BY W. HAGUE HARRINGTON, OTTAWA.

In June, 1892, in company with Mr. Fletcher, who was anxious to obtain *Erebia Discoidalis*, Kirby, I made a visit to the famous Sudbury mining region. Leaving Ottawa on the 15th, at 3.40 p.m., we arrived at Copper Cliff at 5 a.m. the following day. As the hour was so early we tried a little collecting before calling on our friend, Mr. J. D. Evans, manager of the copper and nickel mines, who had kindly invited us to stay with him. Everything was rather moist, however; and but little could be found at this early hour except a few examples of *Banchus flavescens*. After breakfast, and some entomological discussions with our host, we sallied forth again, but showers interfered materially with collecting, and we were able to do little more than gain an idea of the character of our surroundings. The district, which is situated about long. 81 W., lat. 46.30 N., is in general somewhat similar in character to the description given by Dr. Hamilton, in a recent paper, of Sparrow Lake, from which it is distant about 150 miles in a north-westerly direction, while it is about 30 miles north of the Georgian Bay. This region is much broken with small hills and hummocks of Laurentian formation, which formerly were apparently covered by heavy forests of pine and other conifers, but which have been swept by fires, and now are sparsely clothed by a second growth of shrubs and small deciduous trees which are springing up among the burnt stumps and logs; while in numerous places the bare glaciated knobs of rock are exposed. Between the hills are occasional small areas of seemingly fertile soil, but usually these low places are swampy and contain the plants common to such moist habitats. The entrance to the Copper Cliff mine faces on a somewhat level piece of ground of moderate area, which has been converted into an artificial *solfatara*, where the glare of molten slag and the fumes of burning sulphur strongly remind one of a volcanic district. In the immediate vicinity of the roasting grounds, and for a radius of several hundred yards around, especially in the direction of the prevalent winds, vegetation has been completely destroyed by the sulphuric acid, with which every shower drenches the ground. Beyond the denuded area the effects are visible for a long distance in the discoloration and bleaching of the plants, which sometimes produce not unpleasant shades of colour or variegations of foliage. Near the mine a small stream flows down through a beaver-meadow, and further up it has been dammed to supply water for the mine. The stream is fringed with alder, willow,

cornel, etc., and the meadow, which has been caused by a former beaver-dam, is covered with coarse grass and sedges, and bordered by small spruce and tamarack.

The afternoon was brighter and Mr. Evans drove us down to Sudbury (about five miles), so that we might visit with him the locality where he had captured five examples of the desired Erebia on 12th May, 1889 (*Ottawa Naturalist*, Vol. III., p. 154.) It was of course a month later, but he was almost certain that he had seen one of these butterflies flit past the Sudbury Railway Station a week before, and we had hopes that we might obtain the coveted insect. Along the road every butterfly that flitted on ahead was anxiously watched, but each proved to belong to some commoner species. We collected many fine examples of *Phyciodes Nycteis*, which was very abundant and in perfect condition. We also obtained, under the loose bark of a stump, a pupa of this species which transformed to the imago during our visit.

From Sudbury we walked across the country in the direction of the Stobie mine; the ground being, as usual, rough and largely covered with ferns and brambles, interspersed with clumps of small poplars, birches, chokecherries, etc. No trace of Erebia could be found, but smaller and less remarkable insects occurred in fair numbers, including several species of saw-flies, of which *Tenthredo semirufa* was the most abundant. Black-flies (*Simulium*) were, however, so numerous and voracious that they made collecting very difficult, while they were ably assisted by the deer-flies (*Chrysops.*) I have had opportunities of becoming acquainted with such intrusive insects from the Atlantic to the Pacific, but I think that the black-flies of Sudbury could take first place for persistence of attack. Having separated from my companions, who carried the bottle of mosquito-oil, I was finally obliged to beat a retreat to the village, where my gory visage excited the risibilities of some of the inhabitants and induced them to size me up as a "tenderfoot." One mining individual went so far as to make some personal reflections on my "everlastingly chawed up" appearance, for which he afterwards apologized by stating that he had recently suffered in the same way himself, and he offered to confirm his unintention of giving offence, by inviting me to inspect the nearest poison (not fly) dispensary, hoping probably to find out if I was prospecting, or interested in mining areas.

Returning to Copper Cliff we spent a very pleasant and profitable evening examining the fine collections made by Mr. Evans in this district,

as well as those which he had gathered at Trenton. The next morning he advised us to go up along the beaver-meadow, and this proved to be the most interesting and profitable collecting ground which we found. Along the short wood-road leading up along the brook to the meadow, *Carterocephalus Mandan* occurred abundantly and a few other butterflies were not uncommon, while coleoptera and hymenoptera were moderately plentiful. In the meadow itself we captured a number of interesting species, of which the rarest was *Nematoplus collaris*, which has not been recorded from Canada. Four examples were taken of this beetle and an equal number of *Dolichosoma foveicolle*, a species which at Ottawa has only been once taken, in a similar habitat. *Nœmia episcopalis* was common with *Anisoticta strigata*, and several examples of *Ditylus cæruleus* occurred on low plants. *Orsodacna atra* was exceedingly abundant, and variable both in size and colour, and several species of Lampyridæ were more or less common. In the sluggish stream which divided the meadow, *Donacia proxima* was as usual on lily-pads, while *D. distincta*, *D. subtilis* and *D. emarginata?* were swept from the fringing sedges and shrubs. Of hymenoptera the most conspicuous was *Trichiosoma triangulum*, upon small willows and spiræas. Some fifty or more were taken, which, with few exceptions, were males. Along the borders of the adjacent wood several fine ichneumons were taken, including males of *Coleocentrus Pettitii*, of which Mr. Fletcher subsequently obtained females (CANADIAN ENTOMOLOGIST, Vol. XXV., page 30.) A pleasant breeze tempered the heat and kept off the flies, so that we were enabled to collect most pleasantly.

The afternoon was spent upon the adjacent hillocks, among the stumps and debris of the old burnt woods, which formerly had yielded to Mr. Evans large numbers of longicorns, etc., but which were then too old to be longer tenanted by such insects. Several of the larger Pimplinæ occurred here, such as Coleocentrus, Ephialtes, Euxorides, Xylonomus and Ecthrus. Hibernated specimens of *Vanessa antiopa* and some skippers were the only butterflies observed. Willows yielded numerous examples of the pretty little weevil *Rhynchites cyanellus*, also *Orchestes ephippiatus*, *O. subhirtus*, *Lepyrus geminatus*, etc.; spiked maples in bloom furnished several elaters and some small bees and other hymenoptera, while a fine male of *Agrilus acutipennis* was captured on birch. In the evening we made, under the guidance of our host, an inspection of the extensive smelting works, and were extremely interested in the

several operations required to produce the large cakes of copper and nickel known as *matte*. The molten slag poured out on the dump-heaps lit up the country for miles around and produced a very weird effect all night. Mr. Fletcher had to leave for Ottawa by the night train, but I remained two days longer and went over the same routes and somewhat extended the area of investigation, but did not materially enlarge our list of captures. A species of Diodontus (which I have not yet been able to place with any of the described forms) was somewhat common, generally at rest on leaves of maples, but not many specimens were collected as the foliage was too damp for sweeping and the insects were too nimble to be easily taken with the fingers alone. *Oryssus Sayi* was taken upon a burnt pine tree, so that possibly it may infest this tree as well as the maple and poplar.

The last day of my stay was so wet that no collecting could be done. Mr. Evans did indeed go with me in the morning to the beaver-meadow, where we waded about through the wet grass, but the rain became so heavy that all the insects disappeared, except mosquitoes, which were exceptionally numerous and aggressive. My time was, however, not unprofitably or unpleasantly spent, as fuller opportunity was afforded for further examination of the extensive collection of beautifully prepared specimens which has been gathered by Mr. Evans, and in which are many rare and interesting species. Each evening numerous moths were taken upon the study window screen, to which they were attracted by a light arranged so as to serve for that purpose as well as for the preparation of accumulated material.

To give some idea of the insects which may be taken in two or three days at the season in question (middle of June), I append a list of the species we collected, with the hope that at no late date our esteemed friend and co-worker, Mr. Evans, will publish his promised catalogue of the large and valuable collection he has made in this little-known region. No attempt was made to collect Lepidoptera other than butterflies, or Diptera (except a few of the larger species), while Orthoptera and Neuroptera were too few in number to be worth recording :—

LEPIDOPTERA.

Papilio Turnus, Linn. Common.
Pieris Napi, Esp., winter form *Oleracea-hyemalis*, Harris. Several.
Colias Philodice, Gdt.
Argynnis Myrina, Cram. Common in beaver-meadow.

Argynnis Bellona, Fab.

Phyciodes Tharos, Dru. Common along wood-road.

Phyciodes Nycteis, Doub–Hew. Common along roads.

Grapta Progne, Cram. One specimen.

Vanessa Antiopa, Linn. Hibernated individuals.

Neonympha Eurytris, Fab.

Lycæna Pseudargiolus, Bd.-Lec.; winter form *Lucia*, Kirby. Not rare, flitting over bushes of spiked-maple in flower.

Lycæna Comyntas, Gdt.

Feniseca Tarquinius, Fab.

Chrysophanus Hypophlæas, Bdv.

Carterocephalus Mandan, Edw. Abundant in wood-roads and openings.

Pamphila Zabulon, Bd.-Lec. In open woods.

Pamphila Zabulon, Lin., aberrant ♀ *Pocahontas*, Scud.

Pamphila Peckius, Kirby. In grassy localities.

Pamphila Mystic, Edw. Along borders of woods.

Nisoniades Icelus, Lint Common along wood-road.

Nisoniades Brizo, Bd.-Lec.

Eudamus Pylades, Scud. Border of woods.

HYMENOPTERA.

TENTHREDINIDÆ—*Cimbex americana*, Leach, var. *La Portei*, St. Farg. ♂; *Trichiosoma triangulum*, Kirby; *Hylotoma McLeayi*, Leach ♀; *H. clavicornis*, Fab., ♀; *Nematus corniger*, Norton; *N. pallicornis*, Norton; *Dolerus aprilis*, Norton; *D. sericeus*, Say; *Monophadnus tibiæ*, Norton, ♂; *Monostegia maculata*, Norton; *Selandria flavipes*, Norton; *Macrophya flavicoxæ*, Norton; *M. contaminator*, Prov., ♀; *M. n. sp. (?)* ♀; *M. trisyllaba*, Norton; *M. varia*, Norton, ♂; *Pachyprotasis delta*, Prov.; *Taxonus rufipes*, Harr., ♂; *Strongylogaster apicalis*, Say, ♂ ♀; *S. soriculatus*, Prov., ♀; *S. annulosus*, Norton, ♀; *Tenthredo rufipes*, Say, ♀; *T. verticalis*, Say, ♀; *T. semirufa*, Norton, ♀; *T. signata*, Norton? ♂ (probably the ♂ of *semirufa*); *T. n. sp. (?)* ♀; *T. ruficolor*, Norton (?) ♀; *Pamphilius ocreatus*, Say, ♀.

UROCERIDÆ—*Oryssus Sayi*, Westwood, ♀.

CYNIPIDÆ—*Figites* (*Figitodes*, Ash.) *inermis*, Prov. ♂.

ICHNEUMONIDÆ—*Ichneumon malacus*, Say, ♀; *I. acerbus*, Cress., ♂; *I. subcyaneus*, Cress., ♂; *I. parvus*, Cress., ♂; *I. canadensis*, Cress., ♀; *I. nigrovariegatus*, Prov. (?); *I. terminalis*, Cress., (?); *Amblyteles stadaconensis*, Prov, ♂; *A. perluctuosus*, Prov., ♀.

Phygadeuon n. sp., ♀; *Cryptus proximus*, Cress., ♀; *C. nuncius*, Say, ♀; *C. canadensis*, Prov., ♂; *C. n. sp.*, ♀; *Pezomachus sp.* (*canadensis*, Cress., ? ♂).

Exochilum fuscipenne, Norton, ♀; *Anomalon anale*, Say, ♀; *Paniscus albotarsatus*, Prov., ♂ ♀; *Campoplex sp.*; *Casinaria n. sp.* (?), ♀; *Limneria*, 3 sp. not determined; *Banchus flavescens*, Cress, ♀; *B. canadensis*, Cress., ♂; *B. borealis*, Cress., ♀; *B. spinosus*, Cress. (?), ♀.

Mesoleptus, n. sp. (?); *Mesoleius sp.* (?); *Tryphon analis*, Cress., ♂; *T. tibialis*, Cress., ♂; *Erromenus crassus*, Cress., ♀; *E. pedalis*, Cress., ♀; *E.* (?) *n. sp.* (?); *Cteniscus, sp.*; *Exyston clavatus*, Cress., ♀; *Exochus lævis*, Cress, ♂; *Orthocentrus sp.*

Coleocentrus Pettitii, Cress., ♂ ♀; *Ephialtes sp.* (near *gigas*, Walsh); *Pimpla conquisitor*, Say, ♂ ♀; *P. tenuicornis*, Cress, ♂ ♀; *P. rufopectus*, Cress., ♀ var.; *Glypta erratica*, Cress., ♀; *Meniscus superbus*, Prov., ♀; *Phytodietus vulgaris*, Cress., ♀ var.; *Euxorides americanus*, Cress., ♂ ♀; *Xylonomus stigmapterus*, Say, ♂ ♀; *Odontomerus mellipes*, Say, ♀; *Ecthrus abdominalis*, Cress., ♀.

BRACONIDÆ.—*Bracon longicauda*, Prov.; *Rhogas parasiticus*, Norton; *Meteorus vulgaris*, Cress.; four undetermined species.

CHALCIDIDÆ.—*Eurytoma, sp.*; one Pteromalid undetermined.

PROCTOTRYPIDÆ.—*Isobrachium, sp.* (?).

CHRYSIDIDÆ.—*Omalus læviventris*, Cress.; *Elampus speculum*, Say; *Notozus viridicyaneus*, Norton; *Chrysis cærulans*, Fab.

POMPILIDÆ.—*Agenia pulchripennis*, Cress.

PEMPHREDONIDÆ.—*Cemonus inornatus*, Say; *Pemphredon concolor*, Say; *Passalæcus mandibularis*, Cress.; *Diodontus sp.*

CRABRONIDÆ.—*Rhopalum pedicellatum*, Pack.; *Crabro bellus*, Cress., 3 ♂; *C. atrifrons*, Cress. (?), ♂; *C. effossus*, Pack., ♀; *C. 6-maculatus*, Say; *C. maculipennis*, Smith, ♂; *C. sp.*, undetermined ♂.

EUMENIDÆ.—*Eumenes fraternus*, Say, ♂; *Odynerus arvensis*, Sauss., ♀ ♂; *O. leucomelas*, Sauss., ♂; *O. tigris*, Sauss., ♂; *O. albophaleratus*, Sauss., ♀; *O. debilis*, Sauss., ♂.

VESPIDÆ.—*Polistes pallipes*, St. Farg., ♀; *Vespa maculata*, Linn., ♀; *V. scelesta*, McFar., ♀.

ANDRENIDÆ —*Prosopis basalis*, Smith, ♂; *Sphecodes dichroa*, Smith, ♀; *Halictus coriaceus*, Smith (?), ♀; *H. confusus*, Smith (?), ♀; *Andrena hilaris*, Smith (?), ♀.

APIDÆ.—*Nomada bisignata*, Say, ♀; *Osmia lignaria*, Say, ♀; *O. simillima*, Smith, ♀; *Apathus Ashtoni*, Cress., ♀; *Bombus ternarius*, Say, ♀.

COLEOPTERA.

CARABIDÆ.—*Pterostichus lucublandus*, Say; *P. patruelis*, Dej. *Bradycellus neglectus*, Lec. (?) or n. sp.

HYDROPHILIDÆ.—*Helophorus lineatus*, Say.

STAPHYLINIDÆ.—*Listotrophus cingulatus*, Grav.; *Stenus sp.*, a small specimen since lost; *Anthobium pothos*, Mann.

COCCINELLIDÆ.—*Anisosticta strigata*, Thunb.; *Nœmia episcopalis*, Kirby; *Hippodamia 5-signata*, Kirby; *H. 13-punctata*, Linn.; *Cocinella trifasciata*, Linn.; *C. transversalis*, Muls.

CRYPTOPHAGIDÆ.—*Loberus impressus*, Lec.

DERMESTIDÆ.—*Byturus unicolor*, Say.

DASCYLLIDÆ.—*Cyphon variabilis*, Thunb.

ELATERIDÆ.—*Elater pullus*, Germ.; *E. luctuosus*, Lec.; *E. nigricans*, Germ.; *E. rubricus*, Say; *E. apicatus*, Say; *Agriotes oblongicollis*, Melsh.; *Dolopius lateralis*, Esch.; *Melanotus castanipes*, Payk.; *M. sp.* (probably a small form of preceding); *Limonius æger*, Lec.; *Campylus denticornis*, Kirby; *Sericosomus incongruus*, Lec.; *Corymbites tarsalis*, Melsh.; *C. triundulatus*, Rand.; *C. æripennis*, Kirby; *C. metallicus*, Payk.; *C. n. sp.*? (one specimen.)

THROSCIDÆ.—*Throscus constrictor*, Say.

BUPRESTIDÆ.—*Dicerca divaricata*, Say; *Melanophila longipes*, Say; *Agrilus acutipennis*, Mann.; *Brachys ærosa*, Melsh.

LAMPYRIDÆ.—*Plateros modestus*, Say; *Ellychnia corrusca*, Linn.; *Podabrus diadema*, Fab.; *P. modestus*, Say; *P. piniphilus*, Esch.; *P. lateralis*, Lec.; *Silis percomis*, Say; *Telephorus fraxini*, Say (?); *T. rectus*, Melsh. (?); *T. tuberculatus*, Lec.; *Malthodes sp.*

MALACHIDÆ—*Dolichosoma foveicolle*, Kirby.

CLERIDÆ—*Hydnocera difficilis*, Lec.

LUCANIDÆ—*Platycerus depressus*, Lec.

SCARABÆIDÆ—*Aphodius hamatus*, Say.

CERAMBYCIDÆ—*Clytanthus ruricola*, Oliv.; *Achmæops proteus*, Kirby; *Leptura sexmaculata*, Linn; *L. chrysocoma*, Kirby; *L. sphæricollis*, Say; *L. mutabilis*, Newm.

CHRYSOMELIDÆ—*Donacia proxima*, Kirby; *D. distincta*, Lec.; *D. subtilis*, Kunze; *D. emarginata*, Kirby (?); *Orsodacna atra*, Ahr.;

Syneta ferruginea, Germ.; *Pachybrachys hepaticus*, Melsh.; *Diachus catarius*, Suff.; *Chrysomela Bigsbyana*, Kirby; *Gastroidea polygoni*, Linn.; *Lina lapponica*, Linn.; *Gonioctena pallida*, Linn.; *Adimonia cavicollis*, Lec.; *A. rufosanguinea*, Say; *Œdionychis quercata*, Fab. (?); *Haltica bimarginata*, Say; *H. ignita*, Ill.; *Crepidodera Helxines*, Linn.

CISTELIDÆ—*Hymenorus pilosus*, Melsh.

LAGRIIDÆ—*Arthomacra ænea*, Say.

ŒDEMERIDÆ—*Ditylus cæruleus*, Rand.

MORDELLIDÆ—*Anaspis atra*, Lec.; *A. flavipennis*, Hald.; *A. rufa*, Say.

ANTHICIDÆ—*Nematoplus collaris*, Lec.

PYROCHROIDÆ—*Schizotus cervicalis*, Newm.

RHYNCHITIDÆ—*Rhynchites cyanellus*, Lec.; *Rhynchites* (?) *sp.* (a small brownish weevil).

ATTELABIDÆ—*Attelabus rhois*, Boh.

CURCULIONIDÆ—*Lepyrus geminatus*, Say; *Pissodes affinis*, Rand.; *Hylobius confusus*, Kirby; *Erycus puncticollis*, Lec.; *Anthonomus signatus*, Say; *A. sp. nov.*? ("marked exactly like *scutellatus*, but more elongate," Dr. Hamilton); *Orchestes pallicornis*, Say; *O. niger*, Horn; *O. ephippiatus*, Say; *O. subhirtus*, Horn; *Elleschus bipunctatus*, Linn.; *Cœliodes tenuipes*, Lec.; *Ceutorhynchus decipiens*, Lec.

SCOLYTIDÆ—*Dryocœtes septentrionis*, Mann.; *Hylurgops pinifex*, Fitch.

HEMIPTERA.

HETEROPTERA.—*Eurygaster alternatus*, Say; *Perillus exaptus*, Say; *Podisus modestus*, Dallas; *Neottiglossa undata*, Kirby; *Cosmopepla carnifex*, Fab.; *Euchistus fissilis*, Uhl.; *Corizus punctiventris*, Dallas; *Cymus augustatus*, Stal., common; *Miris affinis*, Reut.; *Lygus flavonotata*, Prov. (?); *Camptobrochis grandis*, Uhl.; *Anthocoris musculus*, Say; *Aradus rectus*, Say; *Aradus* (two species unnamed); *Coriscus inscriptus*, Kirby.

HOMOPTERA.—*Pubilia concava*, Say; *Cixius stigmatus*, Say; *Stenocranus dorsalis*, Fitch; *Lephyronia quadangularis*, Say; *Bythoscopus sobrius*, Walker; *B. variabilis*, Fitch; *B. pruni*, Prov. (?); *Idiocerus alternatus*, Fitch; *Agallia novella*, Say; *Tettigonia hieroglyphicus*, Say; *Thamnotettix subcupræus*, Prov.

SUMMARY.

The species enumerated in the foregoing lists are as follows:—Lepidoptera (Butterflies) 21, Hymenoptera 125, Coleoptera 102, Hemiptera 27, making a total of 275.

SOME UNDESCRIBED STAGES OF NOCTUID LARVÆ.

BY HARRISON G. DYAR, NEW YORK.

RAPHIA FRATER, *var.* COLORADENSIS, Put.-Cr.

Mature larva.—Head rounded, partly retracted under joint 2, waxy greenish-white, ocelli black; mouth white. Body of nearly uniform width, joint 13 smaller; segmental incisures deep. Colour translucent, clear green, with many yellow piliferous dots, on joints 3 and 4 the dorsal ones tipped with red, and a central pair of these are prolonged into short, contiguous processes. On joints 5, 9 and 12 each, a transverse, curved, yellow band, reaching to the first dot above the spiracle. These bands are whitish anteriorly, those on joints 9 and 12 partly bordered in front with crimson. Feet green, the anal pair tipped with yellow and crimson. Spiracles small, black. There are 8 of the piliferous dots on each side of a segment, besides a dorsal row of non-piliferous ones.

Cocoon.—Hard and firm; composed of bits of dirt and stones spun together.

Pupa.—Cylindrical, abdomen rounded, its segments appressed; cremaster very short, but broad and thick, without hooks. Cases and central portion of abdominal segments densely and finely wrinkled. Colour, chestnut; width, 5 mm.

Food-plant.—Poplar. Larvæ from Yosemite, California.

ACRONYCTA RADCLIFFEI, Harvey.

Dr. Thaxter has described the mature larva, and noted that it mimics Datana larvæ.

Larva before last moult.—Head bilobed, shining, the tops of the lobes brown, the front and sides mottled with large blotches of pink, the back of the head white, the clypeus and an area outside of it, green; mouth and ocelli brown; width, 2.4 mm. A few hairs arise from the head. Body enlarged dorsally on joint 12, with five rows of warts on each side, one on each segment and each bearing a black hair. Cervical shield black; a broad brown dorsal stripe, containing a red line centrally and edged with yellow, covering the first two rows of warts and ending at joint 12; the rest of the body is green with a faintly indicated white stigmatal line. Spiracles small, black rimmed.

After last moult.—Head bilobed, slightly shagreened but shiny, and furnished with a few hairs; colour black, the upper third in front, reaching to the upper half at the sides and posteriorly, orange-red; width, 3.3 mm. Body enlarged a little dorsally at joint 12; cervical shield with two rows of small warts, black, as are also the anal plate and feet. Warts small, some minute, about 24 per segment, besides those on the venter of the legless segments; warts pale, bearing thin, long, whitish hairs (7 mm.) Body black, paler ventrally, a dorsal red line from joints 3 to 11; two lateral and one substigmatal pale yellow lines, the upper one reaching from joints 3 to 11, the lower two from joints 2 to 12, confluent posteriorly. The substigmatal band is broader than the others and reaches narrowly to the top of joint 13, sending a branch to the top of joint 12, to which branch the two other lateral lines barely reach. Spiracles white. As the stage advances the dorsal line fades to the colour of the others.

Food-plant.—Wild cherry (*Prunus serotina*).

Larvæ from Rhinebeck, New York.

ACRONYCTA IMPLETA, Walker.

subochrea, Grote.

Larva, about half grown.—Head subquadrate, notched on vertex, the lobes pointed anteriorly; pale whitish, with eight pale brown spots: one covering the eyes, one before apex of each lobe, and two smaller ones respectively above and below and below the other two. Body deeply incised between the segments. Feet normal. Warts arranged as in the Arctiidæ and Liparidæ; row i. on joints 5–12 in subdorsal space; row ii. subdorsal; row iii. superstigmatal; row iv. obsolete; rows v. and vi. in the subventral space. All concolorous with the markings. Colour pale translucent yellowish, with a white subdorsal line below warts ii. Warts ii. and iii. on joint 2, and ii. on joint 3, brown. Brown patches dorsally on joints 5, 6 and 9, and irregular ones on joints 11 and 12. Hairs blackish, fine, not abundant.

Food-plant.—Witch-hazel (*Hamamelis virginica*).

Larvæ from Rhinebeck, New York.

PERIDROMA INCIVIS, Guen.

Egg.—Irregularly spherical, the base flattened; vertically striated, the

striæ becoming irregular near the vertex where they meet. Colour pale yellow. Diameter about 0.5 mm. Laid in a single layer, the eggs contiguous to each other.

First stage.—Geometriform. Head round, brownish. Body semi-transparent whitish with a purple shade, and small black dots. Thoracic feet black, the abdominal ones well developed only on joints 9, 10 and 13. Later it becomes more as in the next stage in markings.

Second stage—Head semi-transparent, almost colourless but with a reddish-tinge; ocelli black, jaws brown; a brown line along the side; width, about 0.6 mm. Body green, a distinct brown stigmatal line with two more above it but less distinct. Another line in the subventral space. A few short, black setæ. Feet all concolorous with body. The larvæ walk like geometers.

Third stage.—Head shining, pale whitish with two faint brownish bands in front, divergent basally; a distinct band at side of head covering eyes, preceded by a fainter one; mouth brownish; width, 0.9 mm. Body grass-green with five dark brown lines on each side, the upper ones rather faint, the stigmatal one very distinct, the subventral one diffuse. Between these last two is a broad white band. Feet all present, but the two anterior pair of abdominal ones much smaller than the others. The larvæ still walk with a looping motion, but less decidedly than before.

Fourth stage.—Head grass-green, shining, marked as before, but the mouth whitish; width, 1.3 mm. Joint 12 slightly enlarged. Colour grass-green; a geminate, dorsal, brownish line, continuing the front lines of head; a pale, obscure, subdorsal and a superstigmatal line, each edged with brownish above; a broad dark brown stigmatal band, below which the substigmatal ridge is white. Thoracic feet semi-transparent. The spiracles on joints 2 and 12 are white. Later, a brownish-red band appears in the centre of the white band.

More rarely the head is very pale whitish-brown, marked as above. Body reddish-brown, somewhat mottled with darker brown. Markings the same, but there are six faint, narrow lines between the dorsal and substigmatal ones.

Fifth stage.—Brown form. Head very pale brownish, marked with black on the clypeus, two broad lines divergent basally and three bands at the side, connected by mottlings; eyes black, jaws brownish, antennæ

pale; width, 2 mm. Body pale brown, mottled with dark brown, more thickly along the longitudinal lines. A row of subdorsal brown spots, smaller at the extremities. Subdorsal and lateral lines faint, narrow, double, irregular. Substigmatal band broad, pinkish-brown, edged on both sides with white, extending on to the feet of joint 13. Piliferous spots small, black. Spiracles white, those on joints 2 and 12 large. Abdominal feet nearly equally developed, the larva walking normally, no longer geometriform.

Green form.—Head pale green, marked the same, but less distinctly. Body grass-green, finely mottled with white, with the faint, narrow, irregular dorsal, double subdorsal and lateral white lines and substigmatal band as above.

Sixth stage.—Head shining pale whitish-brown; antennæ and mouth paler; jaws tipped with black; ocelli black. Down the front of the head extend two broad, black bands, diverging on either side of the clypeus and ending before reaching the mouth. These are connected by mottlings with a fainter band before the eyes on each side. Behind the eye are three more bands, irregular and partly connected. An obscure white band runs from base of antennæ to meet the substigmatal line on the body. A few setæ. Width, 3 mm. Body pale brown, mottled with black and a little white on the dorsum, the latter mostly in narrow dorsal, subdorsal and traces of the other lines. A subdorsal row of black diffuse spots, more distinct on the middle segments. Substigmatal band pinkish, edged with white. Piliferous spots small, white, those on the venter black.

Food-plant.—Fed on bur-grass (*Cenchrus tribuloides*).

Larva from Lake Worth, Florida.

HADENA EVELINA, French.

Head sordid green; ocelli black; width, 2.5 mm. Body green, mottled with white; a narrow, dorsal, white line and traces of a subdorsal one in segregations of the mottlings; a distinct, but narrow stigmatal white line, passing below the spiracle on joint 12 and on to the anal foot. Spiracles black ringed. Piliferous dots not distinct. Later the colour is pale brown, sparsely mottled with black. Head brown, reticulated with dark brown. Anal plate and cervical shield dark brown, the latter edged in front with black. The mottlings give the appearance of oblique segmental shades. Piliferous dots black, narrowly surrounded by white.

Food-plants.—Lupine (Lupinus) and wild currant (Ribes).

Larvæ from Yosemite, California.

XYLOMIGES SIMPLEX, Walker.

crucialis, Harvey.

Head black, smooth, shining; labrum and bases of antennæ pale yellow; width, 2.6 mm. Body not distinctly enlarged at joint 12, but joint 13 small. Piliferous tubercles very large, shiny brownish, each with a single hair. Body sordid greenish-white, of no decided colour, slightly translucent. A dorsal and subdorsal paler white lines. A broad pale yellow stigmatal line, shaded with orange centrally, continued narrowly and indistinctly on to the anal feet. Spiracles black.

Last stage.—Head bright shining red-brown; labrum and bases of antennæ white; jaws and ocelli black; width, 4 mm. Thoracic feet pale red-brown. Body sordid, subtranslucent white. Dorsal and subdorsal lines narrow, faint, white. Stigmatal line broad, pale yellow, enclosing the black spiracles. Piliferous dots small, black, with somewhat elevated larger bases. Under a glass the body appears mottled with white.

Food-plants.—Willow (Salix) and wild currant (Ribes). The larvæ live singly in houses made of leaves lined with silk, closed except for a hole at one end.

Found at Yosemite, California.

ACONTIA ERASTROIDES, Guen.

Egg.—Conical, flat at base, with 14 longitudinal ribs, the alternate ones slightly projecting at the top, the others not reaching quite so far. Besides these are many transverse ridges, but slightly elevated. Colour uniform green; width, 0.25 mm.; height, 0.35 mm.

First larval stage.—Geometriform, with only 10 well-developed legs. Green, a transverse band around each segment brownish, somewhat elevated. Head, cervical shield and thoracic feet black.

Larvæ from Rhinebeck, New York.

CATOCALA CEROGAMA, Guen.

Ash-gray, with many longitudinal rows of black points. Two black elevations on joint 12. Venter yellowish-green, this colour separated from the dorsal gray by a subventral line of white fringe-like processes. Head gray with black markings; joint 2 spotted with black.

Food-plant.—Linden (*Tilia americana*).

Larva from Ulster Co., New York.

THE MOTTLED UMBER MOTH.

(*Hibernia defoliaria*, L.)

BY JAMES FLETCHER, OTTAWA.

Some years ago I received from the Rev. G. W. Taylor, of Victoria, Vancouver Island, a specimen of the Mottled Umber Moth. This had been named by the Rev. G. D. Hulst, of Brooklyn, and was, I believe, the first specimen of the species recorded as taken in America. Later, in 1889, two specimens were forwarded from the same place by Mr. W. H. Danby. Since that time, although looked for regularly at the time the males fly in autumn, none had been observed until this year, when the larvæ were so abundant that they caused considerable injuries to plum and cherry trees.

HE MOTTLED UMBER MOTH; MALE AND WINGLESS FEMALE; CATERPILLAR AFTER TASCHENBERG. (Figure kindly lent by Miss E. A. Ormerod).

The following interesting letter on the occurrence of this insect last season is from Mr. W. H. Danby:—

"Dec. 7, 1893.—*H. defoliaria* has been wonderfully plentiful this year in comparison with other seasons. During June and in the early part of July, the larvæ were a pest in most orchards and gardens, and they fed upon cherry and plum, seeming to prefer the plum. None were seen on apple. In one garden a young cherry tree, 6 feet high, had a quantity on it, and the plum trees suffered considerably from the voracity of the larvæ; but the apple trees in the same garden were not affected. I forwarded larvæ to you June 20th, and placed others in a breeding cage, being lucky enough to successfully rear several to the imago. I am glad to know that you also bred the imago. In 1889, I took 3 males in Victoria, and since then have looked for it everywhere in vain till this season, when the larvæ swarmed. The imagos began to appear about November 15th, and the electric lights proved as usual to be a great attraction. On the doorways of two hotels I collected eight dozen in one morning, and every day after that more or less were to be found on the stone walls of the aforesaid hotels. One peculiar result of the electric light drawing the male imagos from all quarters to the centre of the city was that in places where they had emerged from pupæ very few males were to be seen, while the apterous ♀ was found to be common. The sexes seem to average about 1 ♀

to 6 ♂ ♂, or say 15% are ♀ ♀. I have made enquiries and fail to find that the larva was seen on apple, whilst everyone I have interviewed on the subject noticed the cherry and plum trees being attacked; still, the larvæ may have fed on apple in places not visited by me, and as you say, 'but surely they also fed on apple,' I presume they do, and I will next year keep a look out for them and watch closely what they do feed on.

"The markings of the males vary very much; I have a series of 6 which are wonderfully unlike each other; in fact, *H. defoliaria* varies in its markings just as much as *C. Bruceata* or *E. Somniaria* do, and some are beautiful by the very reason of their wonderful contrast to the type—while one has the bands nearly black, another has apparently no median band, but is thoroughly suffused.

"The females are fond of climbing to the top of the fence rails and sunning themselves. They have very long legs, it seems to me, so much so that they have trouble in walking. Most of the imagos bred by me were females."

The caterpillars sent me by Mr. Danby were received at Ottawa on June 28th, and were full grown. They pupated in a few days, most of them on the surface of the ground, but some a short distance beneath. A few specimens were parasitized by the larvæ of a Tachinid fly. The first moth, a male, emerged on November 27th, so that the pupal stage lasted almost five months. The pupa is smooth, dark reddish-brown, nearly ¾ of an inch in length, and has the last segment terminated by a stout spine. The moth is of a dull ochre-brown hue, expanding 1¾ inches, and has the upper wings dotted and crossed diagonally by two dark waved bands; the space between these two bands is pale and bears a dark discal spot; the lower wings are paler than the upper, and like them sprinkled with brown dots and have a dark spot near the middle. The female moth is brown with two rows of conspicuous spots down the back. The wings in this sex are almost entirely aborted.

The occurrence of this insect at Victoria is worthy of note, as in England it is one of the worst orchard pests. In England, however, it is chiefly an apple pest, and it is rather strange that it has not been found on apple trees in British Columbia. Miss E. A. Ormerod says as to the food of the Mottled Umber Moth:—"The caterpillars are very abundant, and very injurious to the leafage of various kinds of fruit and forest trees, as oak, lime, etc. They have been especially noted as feeding at times on unripe cherries, gnawing away one side of the fruit." ("Manual of Injuri-

ous Insects," p. 337.) The habits of this moth are very similar to those of our canker worms (*Anisopteryx*). When the moths appear in the autumn, the females crawl up the trunks of trees and lay their eggs on the branches. In this condition the insect passes the winter.

The following description of the larvæ was taken from the British Columbian specimens sent by Mr. Danby :—

Mature Larva.—Length, 1¼ inches. Head, round, bilobed at apex, chestnut-red, mottled. Mouth parts darkened. Dorsal region reddish-brown, darkened with fine black broken lines arranged as follows: A dorsal double stripe which widens a little in the middle of each segment and is shaded with pale yellow ; two narrow subdorsal lines, rather indistinct, and placed on a reddish field ; a double lateral stripe, the lower line of which is distinct and sinuous. Beneath this dorsal area the stigmatal area is bright yellow. The spiracles themselves are white, ringed with black, and are in the centre of blotches of reddish-brown shaded anteriorly with black. Ventral area, including thoracic feet and prolegs, pale yellow. Some specimens are much darker than others ; in the darkest there is a broken supraventral stripe just beneath the substigmatal fold, sometimes running up on to it. The prolegs on 10th segment are also sometimes darkened exteriorly.

I believe the British Columbian insect to be identical with the English, as I can find no difference between either the moths or the caterpillars.

DESCRIPTIONS OF TWO NEW HYMENOPTEROUS PARASITES FROM WATER BEETLES.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

I can find no record of the breeding of Hymenopterous parasites from water beetles, in either the European or American faunas, and it is, therefore, with considerable pleasure that I here describe two distinct species of Hymenopterous insects, reared from water beetles by Mr. H. F. Wickham, of Iowa City, Iowa, belonging in genera not yet reported as occurring in our fauna.

The genus *Gausocentrus* is one of Förster's new genera erected in his "Synopsis der Familien und Gattungen der Ichneumonen," 1868, p. 198, and appears a valid one, although, so far as I am aware, it still remains unrecognized by European authorities.

Cyrtogaster, Walker, is a well-known European genus well represented in our fauna, although now noticed for the first time, my collection containing not less than seven undescribed species. Kirchner records eleven described species in Europe.

SUB-FAMILY TRYPHONINÆ.

Tribe *Mesoleptini*.

Genus *Gausocentrus*, Förster.

1. *Gausocentrus gyrini*, sp. n.

♂.—Length, 3.5 to 3.8 mm. Black, shining, impunctate, clothed with a sparse, fine greyish pubescence, more apparent on face and metapleura, the apex of second abdominal segment broadly margined with red; petiole and second segment towards base subopaque, the former channeled, the latter feebly aciculated basally; petiole very long, rather slender and nearly as wide at base as at apex, about one-fourth longer than the second segment; third segment about two-thirds the length of second; fourth about half the length of third; following segments a little shorter subequal.

Head transverse, a little wider than the widest part of thorax, polished, except the face, which is feebly rugulose; clypeus subconvex, polished, truncate at apex; eyes larger, extending nearly to the base of mandibles; palpi pale or yellowish; mandibles pale rufous, bi-dentate, the teeth subequal; antennæ long, filiform, 20-jointed, reaching to base of second abdominal segment, the scape and pedicel obscure rufous, stouter than the flagellum and together not quite as long as the first flagellar joint, the flagellum black, cylindrical, of a uniform thickness throughout, finely pubescent, the joints gradually shortening toward apex.

Thorax smooth, with two well-defined parapsidal furrows; pronotum contracted, much narrower than the mesonotum; scutellum with a deep transverse depression at base, behind which it is convexly elevated; metathorax areolated above, rounded off posteriorly, with the pleura finally rugose; tegulæ and legs, including all coxæ, brownish-yellow, or pale ferruginous, the middle and hind tarsi and the posterior tibiæ above, subfuscous; tibial spurs, 1, 2, 2, not conspicuous; wings hyaline, the large stigma and venation dark brown; areolet pentagonal; second discoidal cell only about half the length of the third, the discoidal nervure very obtusely angulate a little before the middle of the third discoidal cell.

Hab.—Independence, Iowa.

Bred by Mr. H. F. Wickham, from pupa of a water beetle, *Gyrinus* sp.

FAMILY CHALCIDIDÆ.

SUB-FAMILY PTEROMALINÆ.

Tribe *Sphegigastrini.*

Genus *Cyrtogaster*, Walker.

2. *Cyrtogaster dineutis*, sp. n.

♀.—Length, 2.5 to 2.65 mm. Bronze-green, confluently punctate; sides of thorax and beneath bluish, or blue-green, with a conspicuous smooth triangular cupreous spot beneath the insertion of hind wing; metapleura with some long greyish hairs; palpi fuscous; mandibles piceous or rufo-piceous; scape, pedicel and legs, except coxæ, brownish-yellow; flagellum black or brown-black; coxæ metallic-green; wings hyaline, the nervures pale.

The head is broadly transverse, wider than the widest part of meso-thorax, or a little more than three times as wide as thick antero-posteriorly, the punctation finer on face and towards the clypeus, the latter with some fine converging striæ; antennæ 13-jointed, inserted a little below the middle of the face, the flagellum subclavate, about one and a-half times as long as the scape; pedicel long, longer than the first flagellar joint and the two ring-joints combined; flagellar joints, after the first, wider than long. Thorax with the parapsidal furrows indicated only anteriorly, the pronotum transverse, much narrower than the mesonotum, the metanotum much produced at apex, confluently punctate, with a carina above; wings hyaline, the apical two-thirds pubescent, the basal one-third bare; the marginal and post-marginal nervures are nearly equal in length, about one-third longer than the stigmal, the stigmal nervure ends in a small stigma with a slight uncus.

Abdomen short ovate, attached to the produced portion of the meta-thorax by a short but distinct petiole, the segments two and three very large, occupying most of the surface, the second with a deep emargination at base, the segments after the third very short, subequal, all united not longer than the third.

Hab.—Independence, Iowa.

Bred by Mr. H. F. Wickham from the pupa of *Dineutes assimilis*, obtained September 1, the flies issuing September 11 and 12.

This species is probably only a secondary parasite, judging from other bred species of the genus in my collection.

BOOK NOTICES.

THE BUTTERFLIES OF NORTH AMERICA: By W. H. Edwards. Third Series. Part XIII.

Another part of Mr. Edwards's magnificent work has been received, and is of particular interest to Canadian students. The three beautiful plates represent the following :—Plate I., *Neominois Ridingsii*, Edw. The upper and lower sides of both sexes of the early and late forms are shown, together with the egg and pupa, and a full series of enlarged drawings illustrating the larva in all its stages. This is a Coloradan insect, and flies in the mountains at an elevation of from 5,000 to 8,000 feet. Up to the present there is no recorded instance of *N. Ridingsii* having been taken in Canada.

Plate II. shows *Chionobas Æno*, Bdl., ♂ and ♀, and a variety of the male, as well as *Ch. Æno*, var. *Assimilis*, Butler, and the egg of *Crambis*, Freyer. *Æno* is an arctic species occurring with the variety in Labrador, and also in Colorado where it inhabits the loftiest mountain peaks. An interesting account of its habits is given from the notes of Mr. David Bruce, who has done a great deal to work up the life-histories of the butterflies of the Coloradan mountains. *Æno* belongs to the *Semidea* group of the genus, and has been confounded with that species and *Crambis*, Freyer. Mr. Edwards says :—"It was not till Mr. Bruce explored the peaks of Colorado that it became possible to understand what *Æno* was, and the limitation of *Brucei* made clear the position of *Crambis*."

The series is now arranged as follows :—

1. CRAMBIS, Freyer.
2. BRUCEI, Edw.
3. ÆNO, Bdl.
   ——— var. ASSIMILIS, Butler.
4. SEMIDEA.
5. SUBHYALINA.

Ch. Also, Bdl., Mr. Edwards rejects altogether as an American species.

Plate III. shows *Ch. Macounii*, the grand species which was discovered at Nepigon, north of Lake Superior, by Prof. John Macoun, of the Geological Survey, in whose honour it was named. *Ch. Macounii* belongs to a different group of the genus to the species mentioned above, and finds its place with *Californica* and some other large species occurring on the Pacific coast. It is a fine insect expanding 2–2½ inches

and has the remarkable feature of lacking the sexual band of androconia or special scales, which is such a striking characteristic of the males of all the other species in the genus. The plate is a very beautiful one, and shows a pale male and the full life-history with the exception of the pupa. The female figured, although of course copied from an actual specimen, is hardly typical of that sex, and it is to be hoped that at some future time Mr. Edwards will publish another illustration showing the more usual form, which has a much richer appearance both on the upper and under sides.

Ch. Macounii is decidedly a variable species, both in the intensity of the golden brown of the wings, in the amount of infuscation along the nervures, and in the size and number of the ocelli. Both sexes frequently have three ocelli on the primaries, and occasionally four. One specimen in my collection, plainly a male, has four distinct ocelli on the primaries, the second and fourth from the apex large and pupilled. In fact, this specimen has more nearly the markings of what appears to me the typical form of the females. There is also a very much infuscated variation of the male which is rarely taken, in which the nervures are all broadly bordered and the greater part of the surface of the disk is covered with dark scales. One of these was mentioned by Mr. Edwards in his original description (CAN. ENT., XVII., p. 74), and was omitted from the plate now published for want of space. The life-history of this species has not yet been fully worked out, as no one has succeeded in obtaining the pupa. It will probably be much like that of *Ch. Chryxus;* but for the present it is unknown, and it remains for some expert and patient breeder to carry the larvæ through all their stages and obtain this missing link. The eggs are easily obtained when a female has been captured; but the breeding is very tedious, the larval life lasting nearly two years.

JAMES FLETCHER.

MONOGRAPH OF THE NORTH AMERICAN PROCTOTRYPIDÆ, by William H. Ashmead. Bulletin of the U. S. National Museum, No. 45; pages 472; plates 18.

Every student of the Hymenoptera must be delighted at the issue of this magnificent volume, which bears most ample testimony to the extensive studies and patient industry of the author. Treating, as he does, of a family in which the American species had previously been but meagrely represented in collections, he has necessarily been compelled to describe

a large proportion of the insects now recognized, and to erect a considerable number of genera for their reception. The labour involved in the critical examinations requisite for the determination and description of so many microscopic forms, and in the preparation of the voluminous text, must have been enormous, yet the author has been able to amplify and embellish his work by the delineation of some one hundred and fifty exquisite figures.

The position of the Proctotrypidæ in the order Hymenoptera is considered to be much more closely allied to some families of the Aculeata than to the Chalcididæ, with which they have been usually grouped, while they also approach in other respects the parasitic Cynipidæ. The Mymarinæ, hitherto included as a sub-family, are set aside as constituting a distinct family allied to the Chalcididæ, so that the species now contained in the Proctotrypidæ are characterized, and distinguished from the Chalcids, by the pronotum extending back to the tegulæ, and the ovipositor issuing from the tip of the abdomen. Ten sub-families are recognized, which contain about one hundred and thirty genera, represented by nearly six hundred species—a doubling of the genera and quadrupling of the species as enumerated in the catalogue of Hymenoptera issued a few years ago by Mr. Cresson. Many of the genera are known only by single species, but others contain numerous forms, the most extensive being Polygnotus (32), Proctotrypes (21), Prosacantha (27) and Telenomus (32). The synoptic tables requisite for the separation of the species in such genera, as well as the tables for the distinction of genera, etc., give evidence of great care and skill in their preparation and arrangement.

While many of the genera are apparently confined to the more southerly and westerly regions, the species in other groups have an extended range, which at times seems to be almost continental, as for instance *Proctotrypes californicus*, which has been taken at Ottawa The members of this family have received but scanty attention in Canada, so that their distribution northward cannot be stated, but undoubtedly many interesting species could be found by a careful and patient collector in any locality. Provancher, in his Faune Entomologique, was able only to announce the occurrence of *nine* species, and about twice as many are recorded in his Additions completed just before his death. Mr. Ashmead, however, has been able to enlarge the list of Canadian species to about ninety. With the exception of three forms from Vancouver Island, the

species are all from a few localities in Eastern Ontario and Quebec, so that the Dominion as a whole has been practically unworked. The three western species are *Mesitius vancouverensis* and *Polymecus vancouverensis*, collected by the Rev. G. W. Taylor, of Victoria (and communicated through the writer to Mr. Ashmead), and *Anteon puncticeps*, taken by Mr. Wickham.

Although the Proctotrypids are all small, and frequently microscopic, they show great variations in structure, and their study thus becomes very interesting. A large proportion of them are egg-parasites, while others prey upon Aphididæ, Cecidomyidæ, etc. In many species (noticeably in the sub-family Bethylinæ) the females differ largely from the males in the shape of the head, antennæ and structure generally. Those of the sub-family Dryininæ have remarkable chelate, or pincer-like claws, on the anterior feet, which are probably for more firmly grasping, during oviposition, the small, active homopterous insects on which the larvæ are parasitic. Many forms are wingless or have very rudimentary wings, but they are, nevertheless, very nimble little atoms, and can leap many times their own length.

As the appearance of Mr. Ashmead's splendid monograph may stimulate some of our members to the collection and study of these insects, it may be stated that a considerable number of the species, such as Bæus, etc., may be obtained even in winter by sifting moss as is done for small coleoptera. This habit of hibernating in the moss of swampy localities is another feature (not mentioned by the author) which separates them from the other hymenoptera known to me, with the exception, perhaps, of ants, which are also occasionally obtained in sifting. W. H. H.

CORRESPONDENCE.

SYNCHLOE LACINIA, ABERR. RUFESCENS.

I had intended to withdraw this name, lest the form to which it refers might be one of those already named as a species; but now that it has been published by Mr. Edwards (Vol. XXV., p. 287), it will be useful to define its precise application. The original specimen was described by me as follows:—Bands ochre strongly suffused with orange above and below; bands on upper side of hind-wings broad, orange, reaching to the row of white spots; outer row of spots on both wings unusually large; band on upper side of fore-wings practically continuous. Size, rather small. Juarez (not Juarey), Mexico, Aug. 26.

T. D. A. COCKERELL,
Las Cruces, New Mexico, Nov. 13th, 1893.

Mailed January 15th.

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A CHECK LIST OF THE NEARCTIC COCCIDÆ.

BY T. D. A. COCKERELL, LAS CRUCES, N. MEX.

It is ten years since Prof. Comstock published his list of North American Coccidæ*, and as the work done since that time is scattered through very various publications, it seems opportune to present a check list, from which the student can learn precisely what species are now credited to our fauna.

All forms from America north of Mexico are included herein, but a few Mexican species which perhaps belong rather to the nearctic than neotropical region, are excluded. Species known to have been introduced and which have no claim to belong to the North American fauna, are placed within square brackets [ ]. Synonyms are in italics.

ICERYA, Sign.

[1. I. purchasi, *Maskell*, 1878.]

2. I. rosæ, *Riley & Howd.*, 1890.

CEROCOCCUS, Comst.

3. C. quercus, *Comst.*, 1882.

GOSSYPARIA, Sign.

[4. G. ulmi, *Geoff.*]

ERIOCOCCUS, Targ.

[5. E. azaleæ, *Comst.*, 1881.]

[6. E. araucariæ, *Mask.*, 1878.]

7. E. quercus, *Comst.*, 1881.

DACTYLOPIUS, Costa.

?[8. D. adonidum, *Linn.*, 1767.]

9. D. citri, *Boisd.*

phyllococcus, Ashm., 1879.

destructor, Comst., 1881.

[10. D. longifilis, *Comst.*, 1881.]

11. D. crawii, *Coquill.*, 1889.

12. D. ryani, *Coquill.*, 1889.

?[13. D. iceryoides, *Mask.*, 1891.]

BERGROTHIA, Kraatz.

14. B. townsendi, *Ckll.*

PHENACOCCUS, Ckll.

15. P. yuccæ, *Coquill*, 1890.

16. P. helianthi, Ckll.

17. P. aceris, *Geoff.*, 1762.

COCCUS, Linn.

18. C. cacti, *Linn.*

19. C. confusus, *Ckll. MS.*

20. C. sorghiellus, *Forbes.*

21. C. trifolii, *Forbes.*

KERMES, "Linn."

22. K. galliformis, *Riley*, 1881.

TACHARDIA, Sign.

23. T. larreæ, *Comst.*, 1882.

ORTHEZIA, Bosc.

24. O. americana, *Walker.*

25. O. occidentalis, *Dougl.*, 1891.

* 2nd Rept. Dept. Entom., Cornell Univ. Exper. Station (1883).

26. O. annæ, *Ckll.*
27. O. edwardsii, *Ashm.*, 1888.
[28. O. insignis, *Dougl.*, 1887.]

PROSOPOPHARA, Dougl.

29. P. rufescens, *Ckll.*, 1893.

ASTEROLECANIUM, Targ.

[30. A. quercicola, *Bouché.*]
31. A. pustulans, *Ckll.*, 1892.

LECANIODIASPIS, Targ.

32. L. yuccæ, *Riley MS.*

POLLINIA, Targ.

[33. P. pollini, *Costa.*
costæ, Targ, 1869.]

PULVINARIA, Targ.

34. P. innumerabilis, *Rathv.*, 1854.
acericorticis, Fitch., 1860.
acericola, W. & R., 1868.
35. P. macluræ, *Kenn. MS.*, *Fitch.* 1855.
maclurœ, W. & R., 1868.
?[36. P. vitis, *Linn.*]
37. P. salicis, "*Bouché*," *Sign.*, 1873.
38. P. bigeloviæ, *Ckll.*
[39. P. camellicola, *Sign.*, 1873.]

LECANIUM, Illig.

40. L. hesperidum, *Linn.*
?[41. L. depressum, *Targ.*]
42. L. armeniacum, *Craw.*
43. L. pruinosum, *Comst. MS.*, *Coq.*, 1891.
44. L. platycerii, *Pack.*, 1870.
45. L. quercitronis, *Fitch.*
46. L. quercifex, *Fitch.*
47. L. fletcheri, *Ckll.*, 1893.
48. L. quercus, "*Linn.*", *Sign.*
49. L. ribis, *Fitch*, 1856.
50. L. tulipiferæ, *Cook*, 1878.
? *tiliæ*, Fitch, nec Linn.
[51. L. pyri, *Schrank.*]
52. L. robiniarum, *Dougl.*, 1890.
robiniæ, Riley MS.
[53. L. persicæ, *Fabr.*, 1798.]
54. L. juglandifex, *Fitch*, 1856.
55. L. fitchii, *Sign.*, 1873.
56. L. cynosbati, *Fitch*, 1856.
57. L. corylifex, *Fitch*, 1856.
58. L. cerasifex, *Fitch*, 1856.
59. L. caryæ, *Fitch*, 1856.
60. L. antennatum, *Sign.*, 1873.
61. L. hemisphæricum, *Targ.*
62. L. hibernaculorum, *Boisdv.*, 1868.
63. L. filicum, *Boisdv.*, 1868.
64. L. oleæ, *Bern.*

CEROPLASTES, Gray.

65. C. cirripediformis, *Comst.*, 1881.
66. C. artemisiæ, *Riley MS. (nec Rossi).*
67. C. irregularis, *Ckll.*
68. C. floridensis, *Comst.*, 1881.
?[69. C. rusci, *Linn.*]

CTENOCHITON, Mask.

?[70. C. perforatus, *Mask.*, 1879.]

ASPIDIOTUS, Bouché.

[71. A. nerii, *Bouché*, 1833.]
72. A. uvæ, *Comst.*, 1881.
var. coloratus, *Ckll.*
73. A. perniciosus, *Comst.*, 1881.
74. A. ancylus, *Putnam*, 1877.
75. A. abietis, *Comst.*, 1883.
76. A abietoides, *Pettit MS.*
77. A. pini, *Comst.*, 1881.
[78. A. cyanophylli, *Sign*, 1869.]
[79. A. spinosus, *Comst.*, 1883.]
80. A. juglans-regiæ, *Comst.*, 1881.
81. A. convexus, *Comst.*, 1881.

82. A. cydoniæ, *Comst.*, 1881.
83. A. rapax, *Comst.*, 1881.
? = camelliæ, *Boisdv.*, 1868.
84. A. perseæ, *Comst.*, 1881.
85. A. tenebricosus, *Comst.*, 1881.
[86. A. ficus, *Riley MS.*, *Ashm.*, 1880.]
87. A. smilacis, *Comst.*, 1883.
88. A. obscurus, *Comst.*, 1881.
[89. A. aurantii, *Mask.*, 1878.
citri, Comst.
var. citrinus, *Coquill.*]
90. A. corticalis, *Riley MS.*
91. A. sabalis, *Comst.*, 1883.

PSEUDOPARLATORIA, Ckll.

92. P. parlatorioides, *Comst.*, 1883.

PARLATORIA, Targ.

93. P. pergandii, *Comst.*, 1881.
var. camelliæ, *Comst.*, 1883.
94. P. proteus, *Curtis*, 1843.
?[95. P. zizyphus, *Lucas*, 1853.]

FIORINIA, Targ.

[96. F. fioriniæ, *Targ.*, 1867.
camelliæ, Comst., 1881.

ISCHNASPIS, Dougl.

[97. I. filiformis, *Dougl.*, 1887.
? = longirostris, *Sign.*, 1882.]

MYTILASPIS, Targ.

98. M. citricola, *Pack.*, 1870.
? = pinnæformis, *Bouché.*
99. M. gloverii, *Pack.*, 1869.
100. M. albus, *Ckll.*, var. concolor, *Ckll.*
101. M. pomorum, *Bouché*, 1851.
? = linearis, *Modeer.*
pyrus-malus, Kenn., 1854.
juglandis, Fitch, 1856.
pomicorticis, Riley, 1873.

PINNASPIS, Ckll.

[102. P. pandani, *Comst.*, 1881.
? = buxi, *Bouché*]

CHIONASPIS, Sign.

103. C. citri, *Comst.*, 1883.
104. C. euonymi, *Comst.*, 1881.
105. C. furfurus, *Fitch*, 1856.
cerasi, Fitch, 1856.
106. C. lintneri, *Comst.*, 1883.
107. C. salicis, *Linn.*
salicis-nigræ, Walsh, 1868.
108. C. spartinæ, *Comst.*, 1883.
109. C. nyssæ, *Comst.*, 1881.
110. C. pinifolii, *Fitch*, 1855.
111. C. quercus, *Comst.*, 1881.
112. C. ortholobis, *Comst.*, 1881.
[113. C. biclavis, *Comst.*, 1883.]

POLIASPIS, Mask.

[114. P. cycadis, *Comst.*, 1883.]

DIASPIS, Costa.

[115. D. cacti, *Comst.*, 1883.]
[116. D. carueli, *Targ.*, 1868.]
[117. D. harrisii, *Walsh*, 1860.
? = circularis, *Fitch*, 1856.
ostreæformis, Sign., (nec Curt.)]

AULACASPIS, Ckll.

118. A. rosæ, *Bouché*, 1833.
[119. A. bromeliæ, *Kerner*, 1788.]
[120. A. boisduvalii, *Sign.*, 1869.]

Fossil Species.

LEACHIA, Sign., (nec Risso.)

121. L. simplex, *Scudd.*, 1890.

NOTES.

(1.) An interesting Monophlebid, representing a new genus and species, is found on *Prosopis* at Las Cruces. It cannot be included in the

list, being at present nameless. Prof. C. H. T. Townsend has given an account of it in Bull. 7 of the New Mexico Exper. Station, and it will be described in detail and named at some future time by Prof. Riley.

The adult ♀ has a large white ovisac, and 9-jointed antennæ. The young (2nd stage) are so much like *Icerya palmeri* that I thought they might be that species; but Prof. Riley pointed out to me that the newly-hatched larvæ could be distinguished from *I. palmeri* without any difficulty, since they possess only four (instead of six) especially long terminal hairs, and these are not so long as in *palmeri*.

On July 21 I was fortunate in finding the ♂. Its body is dark dull red, antennæ and legs black. The wings are smoky with a dark costa and two white lines. There are no conspicuous caudal appendages, but two black bristles of only moderate length. Dorsum of thorax more or less shiny black.

(2.) It seems doubtful whether *Dactylopius adonidum*, as defined by Signoret, can be definitely recorded from North America.

(3.) *Dactylopius iceryoides*, *Ctenochiton perforatus*, etc., are mentioned in *Insect Life*, April, 1893, p. 281–2, as having been imported into California. I suppose, however, that they have not become established there, and so have marked them with a query in the list. The species referred to are Nos. 13, 41, 69, 70. Others mentioned in the same article are well-known to be established in America.

(4.) *Bergrothia* takes the place of *Westwoodia* (preoccupied). A second species is known to occur in North America, but it has not been named.

(5.) Nos. 14, 16, 26, 38, 67, 72 var., and 100 var. have not been published at the date of writing, but their descriptions have been sent out for publication.

(6.) *Phenacoccus* takes the place of *Pseudococcus*, Auctt., nec Westwood.

(7.) *Coccus confusus* (which probably includes all reputed *C. cacti* of the Rocky Mtn. Region) is congeneric with an insect from Mexico, which Lichtenstein identified as *Acanthococcus tomentosus* (Lam.). The larva has spines after the manner of *Capulinia sallei*; the antennæ of the adult ♀ are very degenerate, 5-jointed. Hab., Las Cruces, N. Mex., on cacti.

(8.) *C. trifolli* and *sorghiellus*.—I know these only from Prof. Garman's account in 2nd Kentucky Report. One can safely say that they

do not belong to *Coccus*, as now understood; and until they are more critically examined it will be hard to guess at their proper location.

(9.) *Orthezia insignis* has been found by Mr. R. H. Pettit in a hot-house in the State of New York.

(10.) Nos. 32, 66, 52 syn., and 90 are credited to Riley MS. The names have all been published (two by Prof. Townsend, two by Mr. Howard), but no formal descriptions have appeared.

(11.) *Pulvinaria vitis* probably occurs with us, but it requires confirmation. It is recorded by Fitch.

(12.) *P. camellicola* I have from Macon, Ga., sent by Dr. Riley.

(13.) *Lecanium armeniacum* is a Californian species; to judge from published figures, much like *depressum.*

(14.) *Lecanium pyri* is recorded by Fitch. He confused some *Pulvinaria* with it, but there is no such species as *Pulvinaria pyri*, Fitch, properly speaking. Mr. J. Fletcher has sent me a *Lecanium* on apple, from P. Edward I.; the specimen arrived squashed flat, but on careful examination I cannot see that it is other than veritable *L. pyri*, Schr. It is strongly and thickly pitted, like the form found by Signoret on apple.

(15.) *Aspidiotus abietoides* will be described by Mr. Pettit. He has kindly sent me specimens.

(16.) *Aspidiotus spinosus* and one or two other species are marked as introduced, because only found on hot-house plants, although their native country is unknown.

(17.) *Aspidiotus juglans-regiæ*, from its mode of occurrence, might be suspected as a foreigner; and it is to be observed that in the same year that it was published, Colvée described an *A. juglandis* from Catalonia. Dr. J. V. Carus has most kindly transcribed for me the description of the latter, and I find it very nearly fits *julans-regiæ*,—so nearly, that the differences in the descriptions may not be essential.

(18.) *Parlatoria zizyphus* I have found on lemons exposed for sale at Las Cruces, N. Mex. The vendor told me he *thought* they came from Mexico, but was not sure.

(19.) It has seemed strange that *Ischnaspis filiformis* was not described until 1887. Dr. V. Carus has kindly transcribed for me the description of *Mytilaspis longirostris*, Sign., 1882, and on reading it, I can hardly believe it is other than *I. filiformis.*

(20.) *Leachia simplex* was described as a *Monophlebus.* Mr. Scudder

has kindly sent me a drawing of the fossil, and judging from this and the description, I would place the insect preferably in *Leachia.*

Postscript.—Leachia, Sign., may be altered to PALÆOCOCCUS, as the name is preoccupied in Mollusca. I did not make the change in the list, as I was not sure whether the Molluscan name was valid, and I hold the "once a synonym, always a synonym" doctrine to the ridiculous. However, I have just received the following from Dr. W. H. Dall, to whom I had applied for information:—"*Leachia* Leseuer, = *Loligopsis*, Lam., but *Leachia*, Risso, according to Monterosato, is valid and is the earliest name for the group to which it is applied. I should advise changing your Coccid *Leachia* under the circumstances." T. D. A. COCKERELL.

NOTES ON COLEOPTERA.

BY C. W. STROMBERG, GALESBURG, ILL.

There are still a few species of Agrilus in our fauna whose food plant is unknown. Any contribution in that direction may, therefore, be of interest. It is a genus that seems to be much neglected by collectors, owing undoubtedly to the difficulty met with in separating some of the species. There are several seemingly difficult ones, however, which are stamped with such distinct characters as to make their study exceedingly interesting. With Dr. Horn's valuable paper, "The Species of Agrilus of Boreal America," and a well-trained eye, one should be able to get along without much assistance. That does not apply to myself, for it was only after Mr. Blanchard kindly undertook to help me out that my material was properly labelled.

Agrilus masculinus, Horn, was taken during July on the common box-elder or ash-leaved maple (Negundo aceroides.) This species resembles *otiosus*, but the ♂ has "prosternum with a space in front densely covered with short erect pubescence." This patch of hair is of a yellowish colour and can be seen distinctly with an ordinary lens if the insect is held up sidewise to the light. Once seen it will always be recognized. The ♀ is not easily distinguished from *otiosus.*

A. otiosus was beaten from hickory, walnut, butternut and dogwood.

A. arcuatus, oak, elm and hazel.

A. fallax, oak, June 12.

A. obsoletoguttatus, quite common on the red and laurel oaks, June.

A. Lecontei, not rare on hackberry (Celtis occidentalis), June and July.

A. impexus occurs on the two locusts (Gleditschia triacanthus and

Robinia pseudacacia), July and Aug.

This sp. resembles *fallax*, but it has antennæ serrate from the fifth joint, while in *fallax* they are serrate from the fourth. There are other well-marked characters for separating them, which are all given in the above-mentioned paper.

Dicerca lepida, Lec., is rare here. It has been beaten from hawthorn, and also found hibernating near the trunks of large trees on the ground among the leaves. Also found it once under bark on a stump, where it had spent the winter.

Pœcilonota thureura, Say., occurs on the black willow during July and Aug., and is not common.

Cinyra gracilipes, Melsh., is quite common on the burr or moss-cup oak (Quercus macrocarpa).

Chrysobothris azurea, Lec , not common. Beaten from linden.

Cacoplia pullata, Hald., is not often seen in exchange lists. Two specimens of this species were beaten from moss-cup oak several years ago.

Zeugophora scutellaris, Suffr., is another which is not offered for exchange. This pretty species occurs on the cottonwood during July and Aug., but seems to be rare.

NOTES UPON LYCÆNA EXILIS, BOISDUVAL, WITH DESCRIPTIONS OF SOME OF ITS EARLY STAGES.

BY WM. H. EDWARDS, COALBURGH, WEST VA.

On July 24th, 1893, I received a number of pupæ of *Exilis*, made on the road, and three nearly adult larvæ (after the last moult), sent me by Mr. T. D. A. Cockerell, at Las Cruces, New Mexico, and found on flowers of Atriplex canescens, of which a plentiful supply was also sent.

Description of ADULT LARVA.—Length at rest, .26 inch; in motion, .3 inch; very like *L. Comyntas* in shape, being long, narrow, about equally rounded at the two ends, segment 2 turned forward to the plane of the underside of the body, and concealing the head; the sides at base nearly parallel, a little convex; the dorsum elevated; from 3 to 10 on dorsum is a flattened, sub-triangular tuberculous process to each segment, as in many species of the genus; colour light green, with a silvery sheen that is caused by innumerable fine, white appressed hairs; the dorsal triangles yellowish, mottled crimson, and there is a crimson mid-dorsal line; on 11 is a dorsal cross-slit, as in *Pseudargiolus* and *Comyntas*, and no doubt there is a pair of cylindrical membranes with

tentacles concealed within 12, as in the species mentioned, though I had no opportunity to see them active; head minute, obovoid, dark brown, placed on the end of a long, conical neck.

CHRYSALIS.—Length, .22 inch, breadth at mesonotum, .06, at abdomen, .09 inch; shape elliptical; the head case rounded and truncated somewhat; the mesonotum slightly prominent, rounded at tip, not carinated, the sides a little convex, followed by a slight depression; abdomen somewhat tumid; colour yellow-white, with a pink tint over the head case; surface sparsely and irregularly dotted black, with two sub-dorsal rows of larger dots of same hue from 5 to 12. One pupa from the three larvæ gave imago 14th August, but as I had omitted to note the date of pupation, I am unable in this case to give the duration of the stage. But another pupa of those formed in route gave imago 29th July, and as it had been mailed on the 22nd, I conclude the stage must endure through six or seven days.

Mr. Cockerell wrote 22nd July:—"Yesterday, walking to the Agricultural College, I found a bush with ants running in numbers over the twigs. Looking to see what they were after, I came across a larva and then another. Presently I saw that the bush was swarming with them, only they were so perfectly concealed by their colour that I should not have noticed them except for the ants. They (the larvæ) were little and big and quite exposed to view. On same bush were many Coleopterous larvæ in their cases, and flying about the bush were many of the *Exilis* butterflies." Some of the ants were sent me with a supply of the flowers, and they were tiny creatures.

In letter of 29th July:—"Yesterday I saw a female *Exilis* deposit an egg; she thrust it under a flower on the outside. I had to look very closely to find it, even after seeing it laid. The egg is circular, seen from above, flat, greenish-white."

Dr. Boisduval described *Exilis*, in 1852, from a female, which he says is the only example of the species he has seen; and speaks of it as one of the smallest Lycænæ known. The male is considerably smaller than the female, and I think may be the smallest butterfly in the world. Notwithstanding its littleness, it flourishes in southern California, Arizona, New Mexico, parts of Colorado, Texas, and has even reached Florida. Mr. Cockerell wrote me 9th December:—"*Exilis* is still in the imago here. I caught one to-day at rest on the stalk of a Solanum. Is it possible that they hibernate as butterflies? We have had plenty of frost, though no snow as yet."

ON SOME AQUATIC LARVÆ, WITH NOTICE OF THEIR PARASITES.

BY H. F. WICKHAM, IOWA CITY, IOWA.

During the past summer, while on a visit to the northern portion of this State, my attention was attracted to the presence of numerous mud cells on the lower surface of stones lying along the bands of the Wapsipinicon River. These cells, most of them empty, with one end forced off, somewhat resembled the single one with which some of our common mud-wasps start their establishment on the ceilings of little-used rooms, or on the rafters of outhouses, but very much smaller. The largest measure about 12 mm. in length and 8 mm. in breadth, while the small ones are only 5 mm. long and 2.5 mm. wide.

After considerable search I finally succeeded in obtaining a curious pupa from one of the large cells, quite different from any with which I was previously acquainted. A cursory examination showed it to possess four eyes, two on each side of the head, the components of each pair being connected by a fine black line. This character directed suspicion to the probability of its being a Gyrinid, and confirmation was furnished by finding the legs, though rather poorly defined, evidently belonging to a beetle of that family. It was finally decided to be *Dineutes assimilis*, Aubé, the common large whirligig of our country. A half day of stone-turning resulted in the finding of more pupæ and several larvæ, as well as two or three of the soft and helpless freshly-emerged beetles. A number of the inhabitants of the little cells were also found in all three stages, and proved to be a *Gyrinus*, probably *picipes*, Aubé.*

Two of the *Dineutes* pupæ were each seen to be accompanied in their cells by a little white larva of rather robust form, evidently there with intent to do great bodily injury. Bringing them home in their original cells, I was able to watch the growth of these little creatures until one transformed to a pupa, and finally disclosed a beetle, which proved to be a species of *Brachinus*, probably *janthinipennis*, Dej. However, the determination cannot be considered authoritative, because the beetle died before attaining its full colours. The larva lies in the cell of its host and extracts the juices through an opening made in one of the wing-pads; the maggot-like body is adorned, but not supported, by six very soft and short legs, which can be of little service except perhaps as "feelers" in

* Detailed descriptions of these larvæ, with figures, may be found in Vol. II., No. 4, of the Bulletin from the Nat. Hist. Lab. of the State Univ. of Iowa.

its dark abode. The mouth is filled with a blackish fluid when withdrawn from the feeding spot. If gently touched, the head and fore part of the body would be raised, as stiffly as consistent with such a soft insect, and this posture maintained for some moments.

The little animals were carefully watched and examined several times a day, until finally the larger one, having withdrawn nearly all the juices from the pupa and become swollen to an unwieldy size, changed, after a day or two of resting, into a pupa—still in the original cell which I had removed from a stone and turned upside-down for more convenient examination. The smaller one was restless and refused to finish its feeding on the original pupa, so, as it had apparently not completed its growth, I tried it with a fresh one of *Tropisternus glaber*, which was immediately accepted as a substitute. The first pupa was probably spoiled, either by mould or bacterial decomposition, hence the necessity for fresh food in this instance. As soon as the larva had completed its growth I consigned it to the alcohol bottle for study.

How the *Brachinus* gets into the cell of its host, whether brought as a young larva clinging to that of *Dineutes*, or deposited as an egg by the mother, is a mystery to me. When small it is more active than when larger grown, and with advanced age becomes gradually more helpless. In any case the complete adaptation to a parasitic habit is apparent in the whole structure—the soft, juicy body, unprotected by chitinous scutes, the weak legs, quite useless for ambulatory purposes, and the lack of strong, locomotive bristles. The appearance is almost that of some Hymenopteron, not at all resembling the strong raptorial larvæ of Adephaga in general. I cannot believe that the larvæ of all our American *Brachinus* live on *Dineutes*, but it is quite possible that they feed on the helpless pupæ of such other Adephaga as frequent the damp spots favoured as habitations by these beetles. Perhaps some of the readers of the CANADIAN ENTOMOLOGIST may be induced to investigate the matter, or to make known the results of study if the investigation be already made.

While two *Dineutes* pupæ were infested as noticed above, another of the same species was seen to be the abode of several little maggots, which soon changed to small black pupæ, loose in the cell, without spinning cocoons. From these I finally got four specimens of a small Chalcid, eleven or twelve days after I first noticed the larvæ, which, however, were nearly full grown at that time. From Mr. Ashmead, to whom I sent the little insects, I hear that they belong to the genus *Cyrtogaster*, not

previously recorded (though known) in North America. He has called it *C. dineutis*, and as Mr. Howard, in a recent paper on the biology of the Chalcididæ*, has remarked that Hymenopterous parasites of aquatic insects are excessively rare, I have thought it worth while to give a rather detailed account of the circumstances connected with breeding them.

Two unbroken cells of *Gyrinus* each contained, besides the remains of the pupa, one specimen of a little Ichneumonid belonging to the sub-family Tryphoninæ, which Mr. Ashmead has described as *Gausocentrus gyrini*. One of these was quite fresh and bright, the other had been dead long enough to break in handling. I think it extremely unlikely that the *Gausocentrus* will prove to be a hyper-parasite, but of course this can only be settled with certainty by further observations on the habits of the larva.

A specimen of the pupa of *Tropisternus glaber* was given alive to a large Carabid larva for food, but not attacked because the larva had just fed up. Two or three days later it was seen that the pupa was dead and the body infested by maggots, which aftewards produced a species of *Phora*, a Dipterous insect which Dr. Williston (who kindly furnished the generic determination) writes me is known to enter pupæ either living or dead. I have no means of ascertaining when or how the eggs were deposited on the pupa, or whether it was attacked in this way before or after death.

Besides the two Gyrinidæ already mentioned, I found under a stone, close to the margin of the river, another larva somewhat resembling them, with long abdominal filaments, only one of which was terminal. Not being able to see the mouth parts on account of the activity of the living specimens, I was unfortunately led to speak of it as probably a Gyrinid larva in the paper referred to, chiefly because of the fact that Packard and Westwood both figure larvæ of this family with large heads. The creature lived in a tin box of earth for five weeks, then moulted and died almost immediately afterward. An examination of the mouth shows it to be a Sialid larva, corresponding closely to Westwood's figures,† except that only one of the mandibles has two teeth, the other being furnished with but one, and the outer lobe of the maxilla has a process articulated to the inner angle instead of a simple production.

* Proc. U. S. National Museum, Vol. XIV.

† Modern Class. of Insects, Vol. II., p. 46.

DESCRIPTIONS OF THE LARVÆ OF CERTAIN TENTHREDINIDÆ.

BY HARRISON G. DYAR, NEW YORK.

(Continued from Vol. XXV., page 248.)

Monostegia quercus-coccineæ, n. sp.

Eggs apparently inserted by a series of thrusts of the ovipositor parallel to the midrib of the leaf. The saw cuts under the upper epidermis are confluent, forming a long blotch over 1 mm. wide and about 20 mm. long, running close to the midrib. The larvæ feed gregariously, eating the lower epidermis and parenchyma.

First stage.—Head oval, higher than wide, mouth pointed; blackish-brown, nearly black on vertex, shining; mouth pale; width, 0.25 mm.

Second stage.—Head shining, pale brown, darker around the black ocellus, pale around mouth; jaws dark; width, 0.4 mm.

Third stage.—Head oval, yellowish testaceous, shining; a brownish shade across between the black eyes; mouth dark; width, 0.55 mm. Body thick through the thoracic segments, slightly flattened, of even width posteriorly. Thoracic feet scarcely visible from above, pale. Abdominal feet on joints 6–12, joint 13 not touching the leaf in walking, but appears to possess a rudimentary pair of feet. Body entirely shiny, sticky, translucent whitish, shading into orange-yellow at the front and sides of thorax. Alimentary canal appearing by transparency dark green.

Fourth stage.—Head orange-yellowish, transparent; eye black; antennæ projecting before, conical; width, 0.8 mm. Body as before. Alimentary canal blackish or green. Dorsal vessel and tracheæ very plainly visible, the latter white, branching into fine ramifications, connected along the stigmatal line.

Fifth stage.—As before, but the body is very slightly milky, not, however, obscuring the internal parts, which are visible. Head, 1.1 mm. in width. The dorsal vessel shows plainly, contrasting with the milky-whitish body.

Sixth stage.—Head light-yellowish, eye black; width, 1.1 mm. Body shaped as before, but whitish, *not shining*, faintly 3-annulate, the internal organs obscured. The colour shades into orange (not ocherous-orange as before) on the thorax anteriorly and laterally; the alimentary canal giving a purplish median shade, centered by the darker dorsal vessel. Upon arriving at this stage, the larvæ leave the tree and form little elliptical cells in the ground for pupation.

Food-plant.—Black oak (*Quercus coccinea*).

Imago.—Black; basal, two-thirds of the wings smoky. Head densely punctured; a polished prominence behind the ocelli; two converging ridges in front, between which the lower ocellus lies; thorax polished. End of femora, all of the tibiæ and tarsi of anterior and middle legs white, except the last tarsal joints, which are dusky. Basal two-thirds of the posterior tibiæ and bases of all the tarsal joints white, the outer third of tibiæ and tips of tarsal joints banded with dusky. Forewings hyaline along outer margin for a space limited by a line drawn from stigma to internal angle, the basal part of wing smoky-blackish; veins and stigma black. Hindwings hyaline, the basal half faintly smoky. Expanse of wings, 10 mm.; length of body, 4.5 mm.

Two ♀ ♀, Woods' Holl., Mass.

Strongylogaster pacificus, Macgillivray.

Head round, pale, sordid whitish with a faint blackish, mottled line from above each eye to the vertex; eye large, round, black; jaws dark-brown; width, about 1.5 mm. Thoracic feet large, bent outward; abdominal ones present on joints 6–12, 13; segments 6-annulate. Colour, shining, translucent green, with a white subdorsal line running the whole length, nearly joining its fellow at the extremities. Spiracles small, black, joined by the thread-like white line of the tracheæ, showing by transparency. Length, about 20 mm.

When through eating, the larva becomes reddish and bores a gallery in a piece of decayed wood, where it remains till the following spring.

Food-plant.—Common brake (*Pteris aquilina*). Larvæ common in June at Portland, Oregon.

Monostegia quercus-albæ, Norton.

Larvæ bred by me on the white oak do not agree with Norton's description. His characterization of the fly, however, seems to fit my specimens perfectly.

Eggs.—Deposited in the manner described by Norton; forming small blisters on the underside of the leaf near the tip, separated from each other, each about 1.2 mm. in diameter.

* * * * * *

Second stage.—Head oval, brown, blackish around the eye; mouth pale; width, 0.25 mm.

Third stage.—As in next stage. Width of head, 0.35 mm.

Fourth stage.—Head angularly pyriform in outline, narrowing upward, widest above the eyes; partly retracted below joint 2; smooth, shining black; width, 0.5 mm. Body very thick through the thoracic segments, more slender posteriorly, then gradually tapering. Thoracic feet covered to the dorsal view; tinged with blackish; abdominal ones present on joints 6-12, 13, the larva resting on them on the surface of the leaf. Colour slightly greenish, transparent, shining and sticky; alimentary canal plainly visible.

Fifth stage.—Not different. Head brownish-black; width, 0.7 mm.

Sixth stage.—Head shaped as before, but of a pale whitish-yellow, eye black; width, 0.7 mm. Body not shining, scarcely more than translucent, of the same yellowish colour as the head, and marked with orange on the sides of the enlarged thoracic segments. Two transverse, dorsal, watery lines on each joint 5–13, the anterior one short, the other reaching the sides. The larvæ now form a cavity in the earth, lined with a brown secretion.

Nematus coryli, Cresson.

Eggs.—Laid on the midrib in the manner of *Cræsus latitarsus*, in a central incision.

* * * * * *

Second stage.—Head black; width, 0.45 mm.

Third stage.—Head rounded, shining blackish, mouth a little paler; eye black; width, 0.65 mm. Body shining, annulate, whitish, the alimentary canal giving a distinct light-green shade. Thoracic feet largely black. A row of blackish spots along the sub-ventral ridge; a pair of black, conical, anal projections. Abdominal feet present on joints 6–11, 13. No tubercles.

Fourth stage.—Head round, shining black; width, 0.9 mm. Body shining, coarsely 4-annulate, smooth, with minute setæ seen with a lens. Colour uniformly slightly olivaceous-green; thoracic feet marked with black at base and tip. A series of large olivaceous patches ventrally on joints 6–10.

Fifth stage.—Head flat before with clypeal dents; shining black; width, 1.25 mm. Segments shining, 4-annulate, setæ with inconspicuous concolorous bases. Colour olivaceous-green, shaded with leaden-blackish subdorsally and on sub-ventral ridge. Venter blackish, with eversible glands as in the mature larva.

Sixth stage.--Head round with a row of indentations bordering

clypeus; entirely shining black; width, 1.8 mm. Abdominal feet on joints 6–11 and 13, with fine ventral eversible glands on joints 6–10, blackish and longer than the feet. Body segments coarsely 4-annulate, smooth, shining, the tubercles represented by minute dark setæ. Colour, honey-brown, the dorsal region to the spiracles shaded with plumbeous black. Thoracic feet pale, tinged with blackish. Greatly resembles the larva of *C. latitarsus;* but the colour is a watery umber-brown, the black marks leaden.

Cocoon.—Formed below the ground. Thin, paper-like, shining, black, elliptical, 8x3.5 mm.

The flies emerged the latter part of July. Found on *Corylus rostrata* at Woods' Holl., Mass., and Plattsburgh, N. Y.

FOOD PLANTS OF SOME CALIFORNIAN LEPIDOPTERA.

BY JOHN B. LEMBERT, JERSEYDALE, MARIPOSA CO., CALIFORNIA.

I have observed the egg laying of the following species of Lepidoptera in the vicinity of the Yosemite Valley, California :—

Danais archippus.—Oviposits on the tender leaves near the flower bud of *Gomphocarpus cordifolius.*

Argynnis epithore.—On the underside of the leaves of *Viola ocellata.*

Argynnis egleis (Highland variety).—On pine burrs, pine leaves, sticks and stones, on the shaded side and as far underneath as is possible for the ♀ to get.

Argynnis egleis (Lowland variety).—Anywhere on the leaves or stems of *Carex filifolia, Festuca ovina, Hordelia fusca, Potentilla gracilis, Viola canina,* etc.

Melitæa chalcedon.—In a cluster like a bunch of grapes, from two to fifteen or thirty eggs at a time on *Castilleia parviflora.*

Chrysophanus cupreus.—Under the leaves and on the side of the stalk of *Rumex pauciflorus.*

Chrysophanus arota.—On the underside of the leaf of Vaccinium.

Chrysophanus helloides.—On the seed pods or in the leaf whorls or the stems of *Oxytheca spergulina* and *Gayophytum diffusum.*

Chrysophanus editha.—On the underside of the leaf of *Hordelia fusca.*

Lycæna dædalus.—Between the petals and sepals or between the sepals and bracts of the flower of *Trifolium monandrum.*

Lycæna rusticus.—As many as four eggs in succession on the upper side of the erect leaves of *Dodecatheon meadia* var. *lancifolium.*

Anthocharis ausonides.—Mostly underneath the leaves of *Arabis* [? sp.].

Colias Behrii.—In the heart of the flower buds or tender leaves of *Vaccinium cæspitosum* and *Gentiana Newberryii.*

Parnassius smintheus.—On the side or top or hidden out of sight on the leaves of *Phlox cæspitosa, Carex filifolia, Gayophytum diffusum,* or on pine burrs, sticks and rocks.

Papilio eurymedon.—Under the leaves of *Ceanothus prosteratus.*

Pamphila sabuleti.—At or near the base of the stem of *Carex filifolia* and under the leaves of *Trifolium monandrum.*

Pyrgus cæspitalis.—In the centre of the plant, *Horkelia fusca.*

Eudamus tityrus.—On the underside of the leaves and on the stalk of *Hosackia grandiflora.*

Eudamus nevada.—Singly or two beside each other on the leaves or stem of *Trifolium monandrum.*

Lepisesia clarkiæ.—On the underside of the leaves of *Clarkia rhomboidea* and *Gayophytum diffusum.*

Hemaris cynoglossum.—On the same.

Alypia mariposa.—On *Clarkia elegans* and *Godetia Williamsonii.*

Alypia Ridingsii.—On *Clarkia rhomboidea* and *Godetia Williamsonii.*

Oncocnemis exemplaris.—On the underside and top of the leaves of *Gentiana Newberryii* and on the grasses in the shadow of the plant.

Anarta Kellogii.—On the upperside of the erect, channeled leaves of *Carex filifolia.*

Plusia californica.—On *Trifolium monandrum.*

Plusia Hochenwarthi.—Mostly underneath the leaves of *Carex filifolia, Gentiana Newberryii,* Salix, Vaccinium, *Antennaria dioica, Mimulus primulariodes, Castelleia Lemmonii* and *Pentstemon confertus.*

Heliothis dipsaceus.—On *Erythræa venusta.*

Pyrausta unifascialis.—On the stems or stalk and on the leaves. A sugar-loaf-like egg, which is laid on sideways, applied near the pointed end on *Oxytheca spergulina* and *Gayophytum diffusum.*

THE GENERA PIERIS, SCHRK., AND EUCHLOË, HB.

BY J. W. TUTT, LONDON, ENGLAND.

In the *Ent. Am.*, 1889, pp. 33–34, is a note by Mr. T. D. A. Cockerell, F. Z. S., "On the origin of the genus *Anthocharis*. Bdv., (= *Euchloë*, Hb.)," and from his remarks on p. 34, it would appear that the larva of *Pieris protodice* and that of *Anthocharis ausonides* are practically identical, Mr. Cockerell's assumption being based on a letter received from Mr. W. H. Edwards. I am not at all certain as to the characters of the American species included in *Anthocharis*, or whether the American Anthocharids are co-generic with our species placed in *Euchloë*, Hb. Kirby separates the genera and includes our common British species, *cardamines*, in *Euchloë*, the American species in *Anthocharis*. I am anxious to learn whether our species of *Euchloë* are co-generic with the American species of *Anthocharis*.

In spite of the similarity of the larva of *Pieris* to that of *Anthocharis* as mentioned by Mr. Cockerell, an unfailing (I believe) point of distinction occurs between *Pieris* and *Euchloë*, the larva of the latter having distinctly 7 subsegments to each segment, the larva of *Pieris* but 6. But a still more constant character exists in the neuration. In *Pieris*, the neuration (Fig. 2) is as follows:—

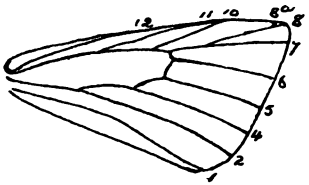

FIG. 2.

i.e.—Nervure 3 is absent, as also is 9, but 8 gives off a small branch at apex—8a. *Pieris brassicæ*, *rapæ*, *napi*, *callidice*, *daphlidice* and *bellidice* are identical in this respect.

But *Euchloë* has a different type (Fig 3). It is as follows:—

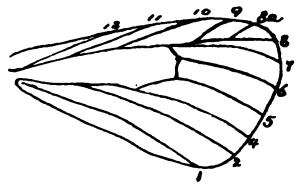

FIG. 3.

By comparing the diagrams above it will be noticed that in *Euchloë*, 7 starts on 8 much nearer the discoidal cell than in *Pieris*. 8a, is much larger in *Euchloë*, and 9 is an extra nervure in *Euchloë* not found in *Pieris*; 10 starts nearer the end of the cell in *Pieris* than *Euchloë*; whilst 6 is nearer to the base of 7 in *Pieris*.

Our *Aporia* is like *Pieris*, except that 7 starts nearly from the base of 8 (near the apex of cell), as in *Euchloë*, whilst 8a also is arranged as in *Euchloë*; 9 is absent as in *Pieris*.

Leucophasia is a modification of *Euchloë*, but owing to the atrophy of the cell which occupies only a small portion of the basal area of the wing, 10 and 11, as well as 7, 9 and 8a, all rise from 8.

I should be exceedingly obliged if any one who has a good collection of the N. American *Pieridæ* would tell me which of the *Pieridi* and *Anthocharidi* have neuration of these types.

I do not wish in any way to suggest disagreement with Mr. Cockerell's views, which may or may not be correct, but at the same time I do wish to show that the superficial larval resemblance is unreliable; and I wish also to obtain some information as to which of the American *Pieridi* and *Anthocharidi* agree generically with our British *Euchloë* and *Pieris*.

Rayleigh Villa, Westcombe Hill, Blackheath, S. E.

ADDITIONS TO THE LIST OF CANADIAN COLEOPTERA.—PART II.

BY A. H. KILMAN, RIDGEWAY, ONT.

As a supplement to my list of additions to Canadian Coleoptera published in CAN. ENT., Vol. XXI., I beg to submit the following list of species taken since 1889, in Canada, and, as far as I can learn, not recorded in any of the published lists.

In the identification of species I have been aided by Mr. Ulke and Dr. Hamilton.

(The numbers prefixed are those in Henshaw's List.)

264 Clivina rubicunda, *Lec.* Very rare, on lake shore.

296 Panagæus fasciatus, *Say.* One, on railway, May 23.

413 Bembidium cautum, *Lec.* Several, in moss, in early spring.

433 Tachys proximus, *Say.* Rare, hibernating in moss.

620 Evarthrus sodalis, *Lec.* Five, in clay, under moss, February.

712 Diplochila obtusa, *Lec.* One, under a log, May.

739 Badister flavipes, *Lec.* Rare, hibernating in moss.

820 Platynus vicinus, *G. & H.* One, on lake shore.

838 " exaratus, *Mann.* Rare, on lake shore, in the debris.

892 Lebia analis, *Dej.* One, found while beating willows at Point Abino.

1119 Harpalus testaceus, *Lec.* Rare, in pasture field, May.

1285 Cœlambus punctatus, *Say.* Several, in a pond, in low woods, May.

1426 Agabus stridulator, *Sharp.* Several, in marsh drain, at Crystal Beach, April.

1477 Hydaticus stagnalis, *Fab.* Eight, in marsh drain, April.

1545 Helophorus nitidulus, *Lec.* One, on lake shore.

1667 Cercyon nigricolle, *Say.* Not rare here, in the manure of pasture fields, June.

2114 Quedius ferox, *Lec.* Very rare, in moss, March.

2337 Stenus indigens, *Casey.* Rare, hibernating in moss.

2484 Cryptobium badium, *Grav.* Rare, on lake shore, June.

2633 Tachyporus elegans, *Horn.* Rare, on fungus, July.

3753 Cryptarcha strigata, *Fab.* One, on a stump, June.

3799 Corticaria dentigera, *Lec.* Not common, found by beating withered branches, July.

3804 Corticaria deleta, *Mann.* Not common, got while sifting moss in spring.

3872 Bactridium cavicolle, *Horn.* Very rare, a pair on maple stump, May 16.

4607 Buprestis fasciata, var. 6—plagiata. Two specimens.

4882 Podabrus basilaris, var. discoideus, *Lec.*

" " var. flavicollis, *Lec.*

" " var. punctulatus, *Lec.*

The varieties of this species are not rare here. They are found on the foliage of pine and other trees in summer.

5013 Collops vittatus, *Say.* A few specimens of a variety in which the thoracic spot is obsolete.

5594 Odontæus obesus, *Lec.* One, from Vancouver.

5771 Lachnosterna marginalis, *Lec.* Not rare.

9623 " profunda, *Bland.* Rare.

9612 " dubia, *Smith.* Common with L. fusca.

5774 " rugosa, *Mels.* Occasional.

These species were found along with thousands of specimens of fusca and other common kinds gathered on the sands of Lake Erie after a storm in June.

6550 Orsodacna atra var. tricolor, *Mels.* Rare.

6553 Zeugophora puberula, *Cr.* Rare, by sweeping low bushes on bank of creek.

6895 Trirhabda convergens, *Lec.* Nepigon. Sent me by Rev. C. J. S. Bethune ; determined by Mr. Ulke.

6944 Œdionychis 6-maculata, *Ill.*

Found this species abundant on one occasion while sweeping with a net in a weedy swamp, July 8. Could not determine what plant.

7070 Microrhopala porcata, *Mels.* One specimen taken while beating.

8677 Orchestes niger, *Horn.* Swept from weeds in June, three years in succession. Never found it prior to 1890. W. H. Harrington mentions this species among those found at Ottawa.

8956 Euchætes echidna, *Lec.* Rare, one found on elm. This specimen is in Mr. Reinecke's collection.

9213 Eusphyrus Walshii, *Lec.* Not rare, found on dead basswood.

A VERY REMARKABLE AND ANOMALOUS SYRPHID, WITH PECULIARLY DEVELOPED HIND TARSI.

BY C. H. TYLER TOWNSEND.

In a lot of flies sent me from Illinois, by Professor S. A. Forbes, I find a most remarkable species, which I am satisfied must be located in the *Syrphidæ*, though the wing shows no sign of the spurious vein, and the first posterior cell is open. The third antennal joint bears a terminal arista, which character is shared by only two previously known North American genera; but the remarkable character of the fly lies in its hind tarsi. These are most abnormally developed, probably only in the ♂ sex, and might well be taken for monstrosities, did they not fully correspond with each other. I regard this as a secondary sexual character.

This syrphid will probably demand the erection of a separate tribe for its reception, its venation being radically different from both *Pelecocera* and *Ceria*, the two genera above referred to as possessing a terminal arista. The wing and hind tarsus are figured in outline, merely to give a more correct idea of the characters of this peculiar fly. On account of its elaborately developed hind tarsi, I propose the name CALOTARSA for the new genus.

CALOTARSA, nov. gen.

Rather small, cinereous or blackish with yellow bands on abdomen, the latter thinly pilose. Eyes contiguous in ♂ for fully ⅔ distance from ocelli to base of antennæ, bare, extending on sides nearly to oval margin. Ocelli situated on vertex. Antennæ small, all three joints short, the

third but little longer than the second, rounded and laterally compressed but small, with a delicate, bare, terminal arista which is 2-jointed at extreme base. Face bare, wholly dark coloured, not prominent, neither carinate, tuberculate, nor hollowed, rather abbreviated below. Thorax narrower than head, with a few weak bristles posteriorly and on scutellum. Abdomen at base about as wide as thorax, narrowing posteriorly. Hypopygium prominent, curved under the abdomen. Wings (see fig. 4) longer than abdomen, spurious vein absent, third vein straight and not bent into first posterior cell, marginal cell wide open, anterior cross-vein far before middle of discal cell and rectangular, first posterior cell open, an apical cross-vein springing from fourth vein about as far beyond posterior cross-vein as length of latter, this apical cross-vein evenly bowed in and leaving the remaining section of fourth vein as a stump at its origin. While the apical cross vein greatly narrows the first

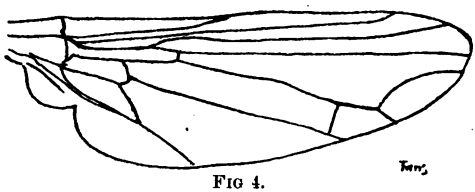

FIG 4.

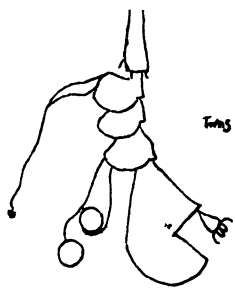

FIG 5.

posterior cell, this stump, or rather this last section of the fourth vein, proceeds on to the margin of the wing, thus forming an extra posterior cell. Posterior cross-vein nearer to margin of wing (on fifth vein) than ½ its length. Anterior and middle metatarsi about as long as remaining tarsal joints together. Hind metatarsi (see fig. 5) and two following joints equal, widened outwardly, thin and flattened, the metatarsus on its outer edge with a long slender cilium or petiole which is winged at its base; the third tarsal joint with a similar cilium, but not winged at base, bearing two round, thin and flattened chitinous tips or appendages, one at the end, the other on posterior border of cilium a little beyond middle and connected with base and inner extent of cilium by a clear thin membraneous wing; fourth joint more elongate, its body or inner portion more thickened, but furnished outwardly with an enlarged thin and flattened wing which is strongly notched on its posterior inner border,

convexly curved on its outer border, and fully 3 times as long as the flattened joint preceding; fifth joint and claws normal.

Calotarsa ornatipes, nov. sp, ♂.

Eyes cinnamon-brown; face, anterior portion of front, cheeks, occiput, and oral region cinereous. Antennæ fulvous, arista brownish. Thorax cinereous, with four brownish vittæ. Scutellum cinereous. Abdomen light brownish, all of second, third and fourth segments except hind borders dark yellow, the yellow on fourth segment being more of a rufous, fifth segment and hypopygium nearly black; thin pile of abdomen yellowish on three anterior segments, darker posteriorly. Front and middle legs light fulvous, tarsi hardly darker. Hind legs fulvous, distal ⅔ of femora blackish, first three tarsal joints and body of fourth clothed with brassy hairs; the winged base of petiole on metatarsus light brownish; the chitinous tips or plates of petiole on third joint, wing of fourth joint, and whole of fifth nearly black. Claws and pulvilli a little elongate. Wings nearly hyaline, hardly tinged with tawny, the third costal cell pale yellowish. Halteres large, knobs brownish, stalks yellowish.

Length, hardly 6 mm.; of wing, 6 mm.

Described from a single ♂ specimen. Illinois.

BOOK NOTICES.

MONOGRAPHIE DES PHYCITINÆ ET DES GALLERIINÆ: PAR E. L. RAGONOT.

The first volume of M. Ragonot's long-expected Monograph of the Phycitinæ and Galleriinæ of the World has just appeared, and forms a quarto volume of 658 pages, besides 56 pages in the preface and introduction, and three plain and twenty coloured plates.

The first plate is devoted to structural details of the head, palpi and antennæ, while the next two plates represent the various forms of venation. The remaining twenty plates represent from twenty to twenty-five species each, with the body and wings of one side, while, in some cases, the underside of the wings of the other side is represented. Many structural details of the head, palpi and antennæ are also exhibited on these plates.

The figures are very accurately and beautifully drawn, and show a delicacy and softness rarely seen. An attempt has been made, for the first time, as M. Ragonot truly says, to represent the veins in the hind

wings correctly, and this seems to have been done quite successfully. The colouring, however, is not as satisfactory, in some cases, as could have been desired.

The introduction gives a complete history of the sub-family and of their structure and classification, and, at the end, a synoptical table of the genera of the Phycitini, the first division of the Phycitinæ. The second division (Anerastini) and the Galleriinæ will appear in the next volume.

It will be seen that M. Ragonot does not agree with many English and American entomologists in classification, for he regards these insects as a sub-family, while many others give them family rank. I must confess that I have, for a long time, been of M. Ragonot's opinion, and varied from it in Smith's List of the Lepidoptera only for the sake of uniformity, since the plan of that work was determined by others. It was a case of "Mohamet and the mountain."

The entire work will form two volumes of Romanoff's magnificent Memoirs of the Lepidoptera, and all the species will be figured, so far as it is possible to secure specimens, except such as have already been figured. American students of the Microlepidoptera, as well as those of other countries, owe a debt of gratitude, not only to Mons. Ragonot for the excellent manner in which he has done his work, but also to His Imperial Highness the Grand Duke Nicolas Mikhailovitch, for affording M. Ragonot the opportunity of publishing this beautiful and useful work, and of illustrating it so profusely. C. H. FERNALD.

EVOLUTION AND TAXONOMY: An essay on the application of the theory of natural selection in the classification of animals and plants, illustrated by a study of the evolution of the wings of insects and by a contribution to the classification of the Lepidoptera, by John Henry Comstock, B. S. The Wilder Quarter-Century Book, pp. 37–113.

All scientific entomologists will be gratified at the appearance of this paper, which is an attempt to base a classification of the Lepidoptera upon the ground of evolution. It is evolution by natural selection, not befogged by the questionable action of so-called "acquired characters." The Lepidoptera are divided into two suborders, the Jugatæ and Frenatæ, according to the two essentially different methods of uniting the fore and hind wings in flight.

The primitive venation is supposed to have consisted of six principal veins or groups of veins, from which the present ones were derived by a

process of specialization in adaptation to new conditions of life. A nomenclature is adopted for these veins, following Redtenbacher, which is to be applicable to all insects, taking account of the veins developed in certain families between radius (sub-costal) and media (discal), and between media and cubitus (median). These the author believes to be of secondary origin. The paper is illustrated by 33 figures of venation and three plates.

It is a valuable contribution to American entomology, and should be carefully read by all who wish to see a scientific classification take the place of the misty divisions heretofore in use in Lepidopterology.

HARRISON G. DYAR.

CORRESPONDENCE.

PAPILIO CRESPHONTES.

On the 17th of October I found near London a colony of larvæ of this butterfly, from one nearly full fed to half-a-dozen little ones about half an inch long. J. ALSTON MOFFAT, London, Ont.

ON TRIÆNA.

The generic term *Triæna* is used by Hübner (see my list, CAN. ENT., xvii., 95, of the North Am. Dagger Moths) for a genus of *Noctuidæ*. Consequently, the Thysanurid genus (CAN. ENT., xxv., 318) must be renamed, and may be called *Macgillivraya*, with *T. mirabilis*, Tullb., as type. A. R. GROTE, A.M.

EUDRYAS CYPRIS.

I would add to my description of this South American species in the Dec. No. of the CANADIAN ENTOMOLOGIST, that the point in which it agrees with *grata* is the deep, outward, even sweep of the pale median field of primaries. In *unio*, the uneven outer margin of the median field is nearly perpendicular from within apices on costa to above internal angle. *Cypris* differs from *grata* by the darker marginal band being continued inwardly from apices along costa, as also by the absence of the prominent dark costal stripe from base outwardly. The darker, creamy and olivaceous or ochraceous median field of primaries, as well as the red unbanded hindwings and undersurface, are quick characters by which *Cypris* may be distinguished from either of its allies. A. R. GROTE.

Mailed February 3rd.

The Canadian Entomologist.

VOL. XXVI. LONDON, MARCH, 1894. No. 3.

NOTES ON "A REVISION OF THE GENUS ŒNEIS" (CHIONOBAS), "BY HENRY J. ELWES, F. L. S., F. Z. S.. PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF LONDON, AND JAMES EDWARDS, F. E. S.," TRANS. ENT. SOC., LOND., 1893, PART IV. (DEC.).

BY WM. H. EDWARDS, COALBURGH, WEST VA.

Mr. Elwes has again favoured us with one of his periodical Revisions of Genera, the last of which, relating to Argynnis, was reviewed by me in the CAN. ENT., XXII., p. 81, 1890.

It is stated that Mr. James Edwards is responsible for the matter of what are called "clasps" of the male, meaning the claspers of other authors; and these parts of the whole body of abdominal appendages are the only ones treated of, or relied on. He has also given a comparative table at the end, based partly on the facies, and partly on the claspers. A plate of these last is appended. On p. 458 is a statement of "the types of clasp-form" found in the genus: "in *Norna* and *Jutta there is an unusual amount of variation*, but the differences are merely those of degree, and are not, in the most extreme cases, sufficient to obscure the relationship of the species." Of like types of the "clasp-form" are:—

1. *Chryxus*, *Bore*, *Taygete*.
2. *Urda*, *Uhleri*. 3. Foreign all.
4. *Semidea*, *Jutta*, *Fulla*.
5. *Subhyalina* (which, according to Elwes, is *Æno*, Boisd., and *Crambis*, Freyer), *Brucei*, *Norna*.

It strikes me that it is rather odd, if claspers are tests of affinity or separateness, that *Chryxus* and *Bore* should fall together; or *Semidea* and *Jutta*; or *Æno* and *Norna*; in each case the two species named

belonging to different sub-groups. *Brucei* as a species was pronounced by Dr. Staudinger originally to be a form of *Bore*. Turning to the plate, it appears that the claspers of *Norna* and what is called "*Semidea*, Colorado form," (and which is *Æno*, Bdv.) are sufficiently alike to be one species, though widely separated by the facies, and *Semidea* of the White Mts. is farther from *Æno* than from *Norna*, though the first two are of one sub-group. The truth is that claspers, or the whole body of abdominal appendages, are unreliable for determining what are species. Mr. Scudder unwittingly gave the *coup de grace* to that fad, when he said, p. 329, Butt., N. E., of Grapta *Interrogationis*, that "the two forms of this species, *Fabricii* and *Umbrosa*, *differ so greatly and so constantly* from each other, not only in the colouring, but in the form of the wings, and *even in the abdominal appendages, that they have been considered as distinct species.*" That is, if they had not by breeding from the egg been proved to be one species, they would be considered as two! But in Mr. Scudder's plates, which are a marvel of drawing, and are of undoubted accuracy, several species of Argynnis have one style of organs; so several Graptas; several Phyciodes, several Theclas, several Limenitis, several Colias, etc.; differing between themselves in each case not more than the individuals of any one species would doubtless differ. We read even in this Revision under view that in *Norna* and in *Jutta* there is an unusual amount of individual variation in the claspers. Of course there is such variation everywhere. In every part of the organization of every species there is individual variation. I have before gone into this subject pretty fully, in the CAN. ENT., XXIII., p. 55, and need not say more here. Though I may as well add that by Mr. Scudder's plates the allied groups do not always show the same style of organs, thus: Grapta *Progne* cannot be distinguished from Grapta *Comma*, though they belong to different sub-groups, while Grapta *Faunus* differs conspicuously from *Comma*, though these two belong to one and the same sub-group. Twenty years ago, before the larvæ of these species had been reared, Dr. Staudinger and others, judging by the facies, insisted that *Faunus* and *Comma* and Grapta *Satyrus* were nothing but one species. See Butt. N. A., Vol. I., Note to G. *Comma* text. And this, by the way, is a good illustration of the unreliability of facies alone for determining species which are closely allied. In my opinion, after reading what has been published by Mr. Scudder on the genitalia, and carefully going over his beautiful plates, I deny that claspers and all the organs together are valuable for the pur-

poses claimed. They may be of aid in case of families and genera; but are unreliable, and therefore valueless in case of species.

We now come to the list of species, p. 460. I shall speak only of the North American species, for I have no acquaintance with others, except such as specimens of the butterflies in my collection afford, and in several cases I have never seen the species. Under *Nevadensis*, Felder, are ranged *Gigas*, Butler, *Californica*, Bdvl., and *Iduna*, Edw. "After comparing very numerous specimens in my own and other collections, from California, Oregon, Washington and Vancouver Island, of which the last was sent me by Mr. Fletcher as *Gigas*, I cannot allow that the differences relied on by Mr. W. H. Edwards between these *Californica* and *Iduna* are of any weight, and I have no hesitation in uniting these four supposed forms. The habitat of THIS SPECIES is peculiar. I have TAKEN IT in Oregon, *at about 2,000 feet*, flying *in stony or rocky pine woods, where there was not much undergrowth.* IT *occurs as high as 7,000 feet, on Mt. Hood, in the same State, according to Morrison, and is common in the pine forests* of Mendocino County, California." That is as good a sample of the illumination of this author as I could select. He has become possessed of, or has seen numerous specimens of THIS species, (one, or at most a trifling number, was sent him as *Gigas*), and undertakes to decide off hand that all these forms are one species, and that IT flies in Vancouver Island, Mendocino and Oregon. Mr. W. G. Wright has taken *Gigas* on Vancouver Island two seasons; has taken *Iduna* at Mendocino two, if not three, seasons; and *Californica* in Washington. He is positive that they are three distinct species, from their habits of flight, and his observations on their behaviour in natural state; and from the character of the regions they constantly inhabit. Mr. Fletcher, who has taken *Gigas* in Vancouver, has written me since he has seen this Revision:—"I don't agree with him that *Nevadensis* is the same as *Californica* and *Gigas* at all. All three are to my mind quite distinct, in the males at any rate."

I, myself, have never seen one of these species alive, but I have bred two of them from egg to adult larva, namely, *Iduna* and *Californica*, in both cases the larvæ reaching the adult stage the same season, but dying before pupation; and twice I have reared larvæ of *Gigas* to the second moult, when they all hibernated. In fact, I have, or ought to have, larvæ of *Gigas* alive to-day. And from these stages, and the behaviour of the larvæ, I am certain there are three species. As Mr. Elwes speaks of the "differ-

ences relied on by Mr. Edwards," he refers to my plates and text in Vol. 2, B. N. A., 1875; and I should here say that when those plates were published, my information as to all these forms was very meagre, and very few examples were in collections. As to *Gigas*, I had never seen the male, and the only one known to be in any collection was the type specimen in the British Museum. So my figure was given from a drawing made for the purpose at the Museum, and it was badly coloured, and inadequately represented the under side of the hind wing, which in this genus is usually the most characteristic part of the insect. As to the female, it was copied from the best of three poor examples which I had from Mr. Crotch, and these were the only examples of the species in American collections. The figures of *Californica* and *Iduna* are well done. I intend before Vol. 3 closes to re-figure *Gigas*, and to give all the stages I may then be able to; and all the stages of the other two except the pupæ. As to *Nevadensis*, it is not a fourth species, though I let it stand alone, not knowing to which of the three it was intended to apply. It was impossible to decide from the very poor figure or the description. I rather thought it was meant to represent *Californica*, but Dr. Holland is confident that it was intended for *Gigas*. If this is so, apparently the name of the Vancouver species should be *Nevadensis*, as the catalogues date it 1867, whereas *Gigas* dates 1868. But Mr. Butler has informed me that Felder antedated by one year his species. It was really not published and on sale till 1868, and subsequent to the issue of the Cat. of Satyr., which figured and described *Gigas*, and so *Gigas* would have priority. A vast deal has been learned respecting these species since 1875, and they are now by no means uncommon in collections.

That Mr. Elwes is sometimes willing to allow that habitat and habits of flight are a factor in determining species, as well as distinct geographical ranges, appears in what he says of *Ivallda*, on p. 469:—"I was inclined to think *Ivallda* was a pale form of this *(Chryxus)*, as I could not see any distinction but that of colour. Prof. Owen, however, who has taken both, assures me that the habitat and flight of the two differ; and, as the geographical range of *Ivallda*, which, so far as we know, is confined to the Sierra Nevada, in Placer County, California, and about Lake Tahoe, is quite distinct from that of *Chryxus*, which is not known to occur in the Rockies in the U. S., *it may probably be looked on as a constantly distinct species*." This is really sensible and to the point. Mr. Bruce had written me from Colorado, last summer, after spending a day

on the peaks with Mr. Elwes:—"In *Ivallda*, as a species, he utterly disbelieves, though Mr. Owen said there was a vast deal of difference between the habits of it and *Chryxus*." Mr. Elwes afterwards visited Professor Owen, and it appears yielded his prepossessions. But why does not a difference in habits and flight and geographical range in the three species before spoken of indicate differences which are specific, as well as in *Ivallda* and *Chryxus*?

On page 466, our author thinks that in the absence of any confirmation of Mr. Fletcher's statement that "a single female of *Macounii* was taken at Morley, Alberta, he is inclined to think this female must have been *Nevadensis*"—which is the first time I have heard that a statement of Mr. Fletcher's needed confirmation by another witness. "But our entomological knowledge of the vast tract of prairie and forest north and west of Lake Superior is so trifling that I have little doubt that it (*Macounii*) will be discovered elsewhere." In the Revision of Argynnis, this author laid it down as a proposition that North America was now so thoroughly explored that no more new species of Argynnis need be expected to appear. Since the publication of which I have described six new species of Argynnis, three of them as pronounced as *Atossa*, *Alberta* and *Victoria*. It is unsafe to prophecy.

Under *Uhleri* is put *Varuna* as identical. "It is impossible to separate the two forms," p. 472. *Varuna* is a plains species, in Dakota, according to Wiley, living on the "bad lands," and on rolling and plateau prairie, which is covered with grass and sage-bush, the elevation about 2,000 feet. Morrison took it in Dakota also, elevation 1,200 feet. Mr. Wright took it in Montana, on the foot-hills of the low, isolated mountains, considerably to the East of the Rockies. He says: "I have never seen it flying west of the Missouri River, nor on any of the spurs of the chief Rocky Mts. It flies only on the lower slopes, say at 2,000 feet or so above the level lands." Mr. Elwes says, that in the Rocky Mts. of Alberta it goes up 4,000 feet, at Kananaskis, which would be equivalent to upwards of 5,000 in Colorado; but that he has taken *Uhleri* in the Rockies at 9,000–10,000 feet, and in Yellowstone Park at 7,000. Mr. Bruce says *Uhleri* is taken at from 5,500 to 10,000 feet, in Colorado. One and the same species of Chionobas does not fly on low grassy plains and on alpine peaks. The differences in the facies of the imago are patent enough to an experienced eye. Undoubtedly they are two

species. I have treated sufficiently of this matter in Part 12, Vol. III., B. N. A. The case is parallel to that of *Chryxus* and *Ivallda*, allowed by the author to be two species. But, if *Varuna* cannot be separated from *Uhleri*, how can the author be sure that the Kananaskis examples at 4,000 feet (5,000 + of Colorado), were not *Uhleri*? It is altogether probable they were. On p. 467, a new species called *Alberta* is described, from Calgary. It is a curious thing that this *Alberta* is put between *Ello* and *Chryxus*, though it is said to "bear the greatest superficial resemblance to *Taygete*." Now, on comparing the description of *Alberta* with the plate and description of *Varuna*, in B. N. A, Vol III., these two cannot be distinguished from each other. Mr. Fletcher tells me he sent me an example of this *Alberta* a year ago, and I returned it labelled *Varuna*. Really this is too too! Why then all this jumble about three other non-allied species?

Mr. Elwes does not think that *Semidea* is found in Labrador; at least he has seen no specimens from that quarter. Here I am pleased to say that I agree with him, as I have never seen a *Semidea* from Labrador. But he has no doubt that a specimen in Mr. Lyman's collection from Hudson's Strait is *Semidea*. Similarly I have a single example, a female, taken at Fort Chimo, Hudson's Strait, that I consider to be *Semidea*. The species will be fully illustrated in Pt. 15, B. N. A., Vol. 3, soon to issue. What Möschler distributed as *Semidea*, from Labrador, was *Æno*, Boisd., and *Æno* is the species taken on the peaks of Colorado. *Assimilis* is a variety of *Æno*, taken in both localities. It is without a band on under hind wings, or almost none. I have treated fully of these forms in Part 14. Mr. Elwes continues, p. 473: "All authors who have yet examined specimens of the form occurring in Colorado seem to agree in identifying them with the typical White Mountains *Semidea*, but, on comparing a series of five pairs from each locality, I can certainly pick out the Colorado specimens by the following characters," etc., etc.; closing thus: "I certainly think there is good ground for looking on it as an incipient species." It is identical with Labrador *Æno* beyond a doubt.

This brings us to *Subhyalina*, Curtis, p. 475:—"I have had more difficulty in dealing with the synonymy of this species than any other, but, *after having compared the unique type of Subhylina*, Curtis, in Guenee's collection, kindly lent me by Mr. Oberthur, the figure of *Crambis*, given by Freyer, the type of *Assimilis*, in the British Museum, and several other specimens in the British Museum from various parts of Arc-

tic America, as well as from Hudson's Straits, I have come to the conclusion that it is impossible to distinguish more than one species. *It is true that the variations in size, colour and distinctness of the band on the hind wing below are great*, but not greater, or even so great, as that found in some other species I have already dealt with," and so on; "this opinion is confirmed by Mr. J. Edwards's examination of the clasps of some of the specimens differing most remarkably in appearance, *including the type of Subhyalina*, in which, fortunately, a critical examination is possible without dissection." I assert that the author here is totally wrong, and that he has mixed up two, if not three species, and I deny that the example in the Oberthur collection is the type of *Subhylina*, Curtis. Curtis described a single male, no other example taken, which, he says, he thought at first sight was an old and faded specimen of Hipparchia *Rossii*, just before described. But, on examination, "it proved to be in good condition." He says it is black and the wings are semi-transparent, and the name *Subhyalina* implies that it is nearly transparent. Hyaline, in the dictionary, is given as glassy, transparent. Now, *Crambis* is a comparatively opaque species, and no more hyaline than are the leathern wings of a bat. *Æno*, Boisd, is somewhat translucent, about as much so as *Semidea*, not transparent, like C. *Brucei*, which is a sub-hyaline species. Neither of these has the peculiar appearance which led Curtis to think it old and worn. *Crambis* is dark brown, *Æno* is brown, varying from livid to yellow-brown. Boisduval, Icones, p. 195, describes the color as "un gris-brunatre-livide melé de jaunatre." *Assimilis*, as I have said, is an unbanded form of *Æno*, and was described by Mr. Butler in his Catalogue of Satyridæ. I sent two examples, one quite unbanded, the other partly, to Mr. Butler, and he pronounced them his *Assimilis* "undoubtedly." It is found wherever *Æno* flies, and copulates with *Æno*. *Subhyalina* was taken in 1830, described in 1835. In course of sixty odd years the chances are against the survival of any particular cabinet insect. It has a hundred enemies, beside the possibility of accident. It is not an unknown thing for the owner of a collection of insects, when a type is destroyed, to attach the label to another example that seems near, or pretty near, the original. He knows of the accident, and of the shifting of the label, and would explain it if circumstances rendered it necessary. But he dies, and his collections pass to another hand, and no one notices the discrepancy between the description and the supposed type. It is the rule that when description and type are found to be antagonistic, the latter must be ig-

nored, and the description alone is the guide. We may be very sure that Curtis never described a brown, semi-opaque, or a yellow-brown semi-translucent insect as sub-hyaline; nor would he have given the name of black to those very different hues; nor would brown and yellow-brown insects have shown the worn and faded appearance of which he speaks, and yet have been said by him to be "in good condition." To reduce *Crambis* or *Æno* to a worn and faded appearance, a pretty complete abrasion of the wing-scales would have been required. It is impossible that the Oberthur insect should be the type described by Curtis. Moreover, Boisduval described *Œno* in 1832, and if it and *Subhyalina*, Curtis, were the same species, *Œno* would have the priority. The history of this Oberthur specimen is this: after Curtis's death, Mr. Henry Doubleday purchased the types of Curtis's Arctic butterflies, and gave them as a present to M. Guenee. And my informant adds, "I think it quite possible that the label may have been displaced. It is even possible that Curtis did not label his types, and that Doubleday may have done the work after Curtis's death, and done it incorrectly. At any rate, if the supposed type does not answer to the description, it is tolerably certain that the type label cannot belong to it. M. Guenee hardly touched the diurnal Lepidoptera, he was essentially a student of the Heterocera. You ask, Why was not the type in this case placed in the British Museum? Probably Doubleday did not attach the importance to type specimens which we do now-a-days."

I will quote here a few lines from a well-known paper of twenty years ago, by the lamented W. Arnold Lewis, entitled "A Discussion of the Law of Priority," 1872. On p. 23: "Now, let us see what real assistance in the way of achieving certainty entomologists can obtain from inspection of type-specimens. He who examines an author's types may find them just as the author placed them, and bearing his labels. On the other hand, he may find them sorted and re-arranged, without labels or fresh ones. * * * He may find the author's labels affixed to species for which they were not meant. Dr. Staudinger says: 'It happens that authors after having created species afterwards mix up in their collections, together with the originals, species which are very near to them,' and Mr. Dawson says: 'Suppose Stephens's collection, instead of coming to us direct from the hands of its compiler and owner, three years ago, had become antiquated, like the Linnean; or *suppose the*

question of the types to be discussed some 60 or 70 years hence, with no more definite knowledge on the subject to assist the inquirer than the Stephensian types and the Stephensian descriptions would supply; might it not be argued that the types (in the cases under discussion) must be ignored, as they never could have been intended to represent the true Loppa pulicaria, Steph., *because they are antagonistic to the description?*'"

Again, quoting Dawson: "Dr. Schaum invariably refers to the Stephensian types; my references are frequently given to Stephens's works, irrespective of the types. Now we are well aware that these do not always correspond, but that, on the contrary, considerable difference is often to be found between them.

"Before the Linnean collection was placed in its present quarters, it was so maltreated by additions, destructions *and displacemeut of labels*, as to render it a matter of regret that it now exists at all."

I must express my astonishment that the author of this Revision should have undertaken to overturn the work of two generations of entomologists, and to mix up several species as one by reference to a single type insect, taken 64 years ago, represented, as he should at once have seen, by a bogus specimen!

The description of Curtis, on which is our sole reliance, applies closely and almost exactly to the species taken at Laggan, and to which Mr. Elwes gives the name of *Beanii*. It is sub-hyaline, as much and perhaps more so than *C. Brucei*. It is pale black, and it has the faded and worn appearance mentioned by Curtis, particularly so by its clouded and smoky underside. The other markings agree well with his description. I described this species as *Subhyalina*, Curtis, in CAN. ENT., XXV., p. 137, 1893, and in Part 15, Vol. 3, B. N. A., it will be fully illustrated. The reading of this so-called Revision convinces me that I was and am right.

In Part XIV. I gave the series of the American species thus: 1 *Crambis*; 2 *Brucei*; 3 *Æno*, and its var. *Assimilis*: 4 *Semidea*; 5 *Subhyalina*; rejecting *Also* as not American, and I hold to this to-day.

On p. 459, Chionobas *Stretchii*, Edw., is excluded from consideration, on the ground that it is the same thing as Hipparchia *Ridingsii*, "of the same author." As the fact that *Stretchii* was not a Chionobas has been known for many years, and published in my catalogues, it was not necessary to refer to it in the Revision. But I will take this opportunity to say that the types, a single pair, have disappeared. They were returned by me to Dr. Behr, after description, 1870. I did not consider them *Ridingsii* then, of course. Now, on comparing the description with that species, I am sure it is not *Ridingsii*. Nor is it *Dionysius*, the other of the known American species of Neominois. Mr. Bruce has suggested that it may be a third species of the genus, inhabiting Nevada (whence the types came) and the deserts of N. E. California, a region thus far wholly unexplored by naturalists. Mr. W. G. Wright goes there with a party of botanists and ornithologists the coming summer, and I trust he will re-discover *Stretchii*.

The value of publications of the class of the Revision under view depends much on whether or no the author is thoroughly acquainted with his subject, and such acquaintance implies considerable experience as a lepidopterist, and study of the forms he undertakes to speak of. He should have an eye for specific differences, and while this comes in part by training, it is largely a natural gift. Some lively workers go all their days without having this originally or attaining it. He should have made himself acquainted with the preparatory stages of as many of the species treated of as possible, for there never will be a final, authoritative revision of any genus of butterflies whatever till these stages in every species of it are known. Species are as clearly distinguished by the form and sculpture of their eggs, by the forms and appendages of the caterpillars, and by the peculiarities of the pupæ, as by the facies of the imago. No man can speak with authority who relies simply on the facies of the imago. This feature has been the occasion of the endless and irreconcilable differences that prevail in nearly all genera up to this day. To proceed further in the same direction is plainly a waste of time. It is a case of the blind leading the blind to undertake to bring order out of the confessed confusion by appealing to facies. Add to the qualifications I have enumerated an acquaintance with the behaviour, habits of flight, and localities of the species, either from personal observation or reliable reports of thoroughly good observers. When an author has this equipment he may with good reason undertake to revise genera, and his decision will be respected.

PREPARATORY STAGES OF LAPHYGMA FLAVIMACULATA, HARV., AND OTHER NOTES.

BY HARRISON G. DYAR, NEW YORK.

Laphygma flavimaculata, Harvey.

Determined by Prof. J. B. Smith. Eggs of this species occurred to me in the Hawaiian Islands at Kaawaloa, Kona, Hawaii and at Honolulu, Oahu.

Egg.—Nearly spherical, flattened at base, densely striated vertically; of a flesh-coloured tint, and covered with gray down; diameter, 0.6 mm. Deposited in a large mass on a grass stem.

First stage.—Head rounded, slightly bilobed, shining black, labrum whitish; width, 0.3 mm. Body small, the feet perfectly normal, the thoracic ones black, the others whitish like the body. Warts arranged much as in Arctia, concolorous with the body, inconspicuous, each with a single stiff black hair. Larva walks rapidly, with a slightly geometriform motion.

Second stage.—Head shining blackish-brown, much paler in front over the clypeus and mouth; width 0.55, mm. Body enlarged at joint 12; bluish green, the tubercles distinct, black, each with a black seta. Dorsal, subdorsal and lateral whitish lines, distinct, even; subventral space whitish, but with no distinct line. Feet normal, all pale, the thoracic ones slightly testaceous. Cervical shield largely shaded with black or brown.

Third stage.—Head dark brown, nearly black, shining; a paler stripe over the ocelli; a few hairs; width, 0.8 mm. Body blackish-green; distinct dorsal, subdorsal and lateral pale green lines, the lateral one narrower than the others. Subventral space and venter pale, defined above by a pale green subventral band, which contrasts with the dark colour of the dorsum, but is only a shade lighter than the venter. Piliferous dots black, distinct, each with a minute black seta.

Fourth stage.—Head entirely black; width, 1.2 mm. Body velvety black, green centrally on the venter, with very narrow, broken, double dorsal, single subdorsal and lateral, and broad, greenish-white subventral lines, the latter not reaching to the last segment. Setæ short, black, the dots no longer distinguishable. Feet pale green, tipped with blackish. Spiracles white. The larva curls spirally when at rest.

Fifth stage.—Head shining black, a little mottled with pale brown on the sides; width, 1.8 mm. Body deep sooty black; the space between

the two narrow dorsal lines is paler, giving the appearance of a broad, pale band with defined edges; subdorsal line triplicate, narrow, faint; lateral line single, more distinct than the others; subventral one not broad, but distinct, yellowish with a green shade centrally. Spiracles white. Venter pale green; feet pale, all tinged with testaceous.

Sixth stage.—Head rounded, shining black, the sutures of clypeus and antennæ white. A pale brown, mottled lateral band. Width, 2.7 mm. Body sooty black to the venter, which is pale whitish, tinged with red, the subventral region less deeply black than the dorsal. On joint 2, a distinct, narrow, white dorsal and subdorsal line, the dorsal absent on the rest of the body. A super-stigmatal, fine, white line, with a series of five very narrow, faint lines above it bluish-white, and broken minutely into dots. Above these two more lines, further apart than the five are from each other, more distinct and continuous. The upper one of these lines joins the subdorsal line on joint 2, but is much narrower than it is. Spiracles white. Subventral line broad, its edges irregular; pale yellow with a central dull greenish or reddish shade. Subventral space mottled with yellowish. Feet pale, greenish outwardly and tipped with reddish. Setæ present, short, dark. As the stage advances, the dorsal line appears, resembling a shining black band against the sooty black ground colour. Subventral space blackish, densely mottled with round, pale spots.

At end of this stage the larvæ enter ground.

Pupa.—Of normal shape; cremaster of two separate, rather distinct, slender points, directed backward. Colour uniformly light brown. Length, 13 mm.; width, 4 mm.

Food plants.—Grasses.

Tæniocampa pacifica, Harvey.

Four stages observed (full number, six?) with the following widths of head:—1.1 mm., 1.5 mm., 2.[2] mm., 3.2 mm.

Mature larva.—Head whitish-green with a few black piliferous dots. Body enlarged at joint 12; feet normal in all the stages observed. Body green, speckled with white; piliferous dots small, black. Narrow dorsal, faint subdorsal, stigmatal and faint subventral white lines, the upper two connected on joint 12 by a broad white band on the hump. The stigmatal line passes on to the anal feet. A white line on anterior edge of cervical shield. Another larva, probably the same, had its head brownish-testaceous, mottled with whitish, clypeus whitish, with a large black shade on each side. Body velvety brown, darker on the anterior portion

on the segments and minutely mottled with pale. A very broad, distinct, white stigmatal line, enclosing the black spiracles and shaded faintly on each segment with pink and yellow, passing very narrowly on to anal foot. On joint 12, on the anterior part of the hump, a dark brown subdorsal shade, defined on its posterior side, diffuse before. There are traces of dorsal, subdorsal and lateral whitish lines. Found on maple and wild cherry.

Larvæ from Yosemite, California.

Forms a firm cell in the ground without silk.

Xylina oregonensis, Harvey.

Head moderately bilobed, smooth, shining green, mottled obscurely with yellowish-green; mouth parts pale, whitish; jaws dark; ocelli brown; width, 3.7 mm. Joint 12 not enlarged; joint 13 small. Lustreless yellowish-green, closely covered with little, short, irregular yellow lines, resembling mottlings. Narrow, broken, almost dotted dorsal, subdorsal and stigmatal lines, the latter passing obscurely on to anal foot. Lines of equal width and much resembling the mottlings. Spiracles small, white with narrow black edge. Piliferous dots distinct, white, each with a single, short, pale seta. Tips of abdominal feet pale. Later in the stage the markings become more distinct, the stigmatal line pale yellow, spotted with red.

Food plant.—Oak *(Quercus Kelloggii)*.

Determined by Prof. Smith from two crippled specimens.

Xylomiges perlubens, Grote.

Egg.—Spheroidal, flattened, closely reticulated, the depressions between forming vertical rows, at the micropyle forming a radiating circular row of smaller cells. There are about 40 rows around the egg. Colour, sordid, pearly white, not shining; diameter 0.7 mm. Laid in a mass, two layers deep, on the back of a leaf.

First stage.—Head pale testaceous, shining; mouth brownish, eyes black; width, 0.3 mm. Body pale whitish, subtranslucent, with large black piliferous dots. Only the last three pairs of abdominal feet are distinct, and the larvæ "loop" about very actively.

Second stage.—Head pale whitish testaceous, densely spotted with black; mouth brown; width, 0.5 mm. Body pale, soft green, joint 12 enlarged, the two anterior pair of abdominal feet smaller than the rest. Piliferous dots large, black. A broad, evident, white stigmatal line, besides narrower dorsal, subdorsal and lateral ones. Setæ black.

Third stage.—Head pale white, with large, black, piliferous spots; width, about 0.9 mm. Body blackish green. Lines white, the stigmatal a little greenish centrally. Piliferous spots large, black, faintly encircled with white.

Fourth stage.—As before. Width of head, 1.2-1.4 mm. A broad, dull red band appears in the centre of the stigmatal band.

Fifth stage.—Head shining pale whitish, reticulated with brown, and bearing a number of large, black piliferous spots; ocelli black; a blackish streak at vertex of each lobe; width 1.9 mm. Body dull green, heavily mottled with black, especially at the sides, where it is nearly entirely velvety black. Dorsal and subdorsal lines narrow, white; stigmatal line sordid reddish, bordered above and below by white. Piliferous dots black, with white centres. Feet pale.

Sixth stage.—Head pale whitish, with a tinge of green, a patch of brown reticulations on each lobe, bordered above and below by a broad, dark brown streak; a number of large, black piliferous dots; width 2.8 mm. Body enlarged slightly at joint 12, feet normal, joint 13 divided by a distinct suture. Colour blackish-green, consisting of black reticulations on a greenish ground. A narrow, black-edged, white dorsal line, interrupted by a series of black intersegmental shades, double on joint 12; a reddish tinge subdorsally; a narrow, black-edged, white subdorsal line; a broad, black, lateral shade; a broad, dull red stigmatal band, bordered with white. Venter paler, mottled with brown. Piliferous dots white, the subventral ones black. Feet pale. Setæ pale, about 1 mm. long. Spiracles white, with a narrow black edge.

Seventh stage.—As before, but the piliferous dots smaller, and the green colour is nearly all replaced by a pale brown.

Cocoon.—A cell in the ground with compact hardened walls, without any web.

Pupa.—Cylindrical, abdomen slightly enlarged centrally, cases moderately prominent; a slight depression between thorax and abdomen. Cremaster very short, consisting of two fused spines, separated at their tips, and two others outside of, but in line with these. Colour light brownish-yellow, unicolorous, but darker in the abdominal sutures. Length of pupa, 14 mm.; width, 5.5 mm.

Food plant.—Wild gooseberry (Ribes).

Prof. Smith has kindly determined the moth from some imperfect, undeveloped specimens.

TWO MORE OF WALKER'S "BOMBYCIDS."

Col. Chas. Swinhoe, of Oxford, has very kindly employed an artist to draw figures of *Heterocampa thyatiroides*, Wlk., and *Cingilia humeralis*, Wlk., for me. The latter is a synonym of *Caterva catenaria*, Cram., though I presume that the genus Cingilia (Trans. Ent. Soc., Lond. (3), i., 76, 1862,) antedates Caterva (new check list, 1882,), and this geometrid must be called *Cingilia catenaria*. It stands in the Liparidæ in Kirby's catalogue. The other name antedates its synonyms, and we have :—

DASYLOPHIA THYATIROIDES, Walker.

1862—Walker, Trans. Ent. Soc., Lond., (3), i., 79.
interna, Packard.
1864—Packard, Proc. Ent. Soc., Phil., iii., 363.
tripartita, Walker.
1865—Walker, Cat. Brit. Mus., xxxii., 419.
signata, Walker.
1865—Walker, Cat. Brit. Mus., xxxiii., 758.

THREE NEW WEST AFRICAN MOTHS.

BY GEORGE A. EHRMANN, PITTSBURGH, PA.

Syntomis hilda, n. sp.

♂.—Antennæ, head and thorax black ; first and fifth segments of the abdomen white, the rest metallic green ; primaries dark brown with three ovate vitreous spots on the sub-apical area ; discal space has two large triangular vitreous spots, the largest being near the inner margin.

Secondaries dark brown, with two small elongate vitreous spots near the base and one small round spot of the same colour in the discoidal area. Underside the brown is a little lighter than above, otherwise it is the same.

♀.—Similar to the male, except that the antennæ are tipped with buff, and the fifth segment of the abdomen is not white, thus leaving the whole abdomen metallic green except the first segment, which is white on the upperside ; the vitreous spots in the wings are the same as in the male, but much larger.

Underside same as above, except that there is a large white spot on each side of the thorax, and the first two segments of the abdomen are creamy white ; legs in both sexes are dark shining brown. Exp. of ♂, 14 mm. ; ♀, 16 mm.

One male and three females in my collection. This lovely species was first taken by Mrs. Hilda Nasmyth at Cape Palmas, Liberia, West Africa, and I esteem it an honour to name it after her.

Syntomis abdominalis, n. sp.

♂.—Antennæ deeply pectinated; head and thorax black. Colour black, suffused with blue metallic scales. Primaries dark brownish, opaque, with two large oval semi-transparent spots in the discoidal area, the largest towards the inner angle.

Secondaries black without any ornamental markings whatever; abdomen deep maroon, except the two last segments, which are black. Underside the same as above, except that the entire abdomen is light carmine, and has a very narrow black lateral stripe on each side; legs light brown. Exp., ♂, 18 mm.

Mr. G. B. Nasmyth has obtained but one example of this beautiful and unique species at Grand Ses, Liberia, W. Africa; the type is in my collection.

Pachypas Nasmythii, n. sp.

♂.—Antennæ fawn-brown, pectinations much darker; head and thorax fawn-brown; the latter with a darker brown stripe running its entire length, similar to that of *P. Honrathii*, Dewitz, and *P. subfascia*, Walker. Abdomen, on the upperside the first four segments are of a very light brown, the rest, including the underside, is of a lovely ferruginous colour. Primaries light brown, median limbal area dark or chestnut-brown; costal inner space slightly shaded with dark-brown, similar to the two darkish marks which are so conspicuous in *P. subfascia*, Wlk.; there is also a dark-brown band, almost black, running through the entire width of the forewing, but not inclined so much as it is in *subfascia*.

Secondaries, basal area whitish and thinly clothed with scales, which gives this space a semi-transparent appearance; the outer marginal space has a broad brown band, darker inwardly, but much lighter on the outer margin; anal margin the same colour as the basal area. Underside of thorax dark brown; the legs are of the same colour.

Underside of primaries, costal space as far as the limbal area, light fawn; limbal area dark brown, with some light shading in the apical space; basal part on the inner angle much paler than the rest of the wing. Underside of secondaries same as above, except that the costal area is shaded with ferruginous. Exp., 5¼ inches. Type in my collection. Habitat, Cape Palmas, W. Africa.

At first sight this noble creature bears a great resemblance to *Pachypas subfascia*, Walker, but having before me Dr. Dewitz's paper, which was published in the Nova Acta. Band, XLII., and which has an excellent figure of Mr. Walker's *subfascia* on Pl. 2, F. 12, I cannot believe otherwise than that I have a new and undescribed species to deal with; and I have named it in honour of its discoverer. Mr. Nasmyth took but two examples of this grand moth, which, I am safe to say, is the giant of the genus. One specimen is in my collection, the other in that of the Rev. Dr. W. J. Holland, Pittsburgh, Pa.

NEW NORTH AMERICAN TRYPETIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Trypeta (Acidia) tortile, n. sp., ♀. Wholly yellow except a black dot above each wing; ovipositor brown; bristles black; scutellum bearing four bristles; thorax and abdomen shining; ovipositor flat, very broad, nearly as long as the last two abdominal segments. Wings hyaline, the anal cell, bases of marginal, sub-marginal, and of the first basal cell, also the apex of the second basal cell, yellow; a black spot on furcation of the second and third veins, and one on lower half of vein at apex of anal cell; a brown band commences on costa between apices of auxiliary and of first vein, and extends to the discal cell, going over the small cross-vein and continuing as a yellowish streak into the discal cell; a second brown band commences on the costa between apices of the first and second veins, and crosses the wing, passing over the posterior cross-vein, and near its terminus sending a spur into the third posterior cell; apex of wing from slightly before apex of the second vein to beyond tip of fourth vein, brown; first and third veins bristly. Length, 5 mm. Washington (O. B. Johnson). A single specimen.

The colouring of the wings somewhat resembles Figure 9, Plate X., of Loew's "Monographs," Part III., but the fifth vein is not bordered with brown; the brown at the apex of the wing is separated at the costa from the preceding cross-band; the band crossing the discal cell is scarcely perceptible, etc.

Trypeta (Rhagoletis) formosa, n. sp., ♂ ♀. Black, the head and its appendages (except the ocellar tubercle and occiput), a line reaching from humeri to each wing, scutellum except the sides at base, halteres and legs, yellowish; thorax and scutellum sub-opaque, the abdomen shining; proboscis slender, geniculate, the apical half bent downward; sides of front and scutellum each bearing four bristles; ovipositor compressed, slightly exceeding the last four abdominal segments in length; wings hyaline, marked with three cross-bands and two spots of brown, extreme base of wing smoky; the first cross-band begins at first vein and extends over veins at bases of discal and third posterior cells, stopping near middle of axillary cell where it is much widened; the second band begins on costa between apices of auxiliary and first veins and extends over small cross-vein, and through the discal and third posterior cells to the wing margin, its greatest width occurring at the fifth vein; a brown costal spot between apices of first and second veins, extending across marginal and

sub-marginal cells; the next band begins just before apex of second vein and crosses the wing, passing over the posterior cross-vein, widest and angled at the fourth vein, the band having the form of a bayonet; a brown spot fills apex of first posterior cell (except sometimes a spot in its extreme apex), and encroaches on the sub-marginal and second posterior cell; length, 3 to 4 mm. Southern California. One male and two females.

The wings somewhat resemble Figure 16, Plate IX,, Loew's Monograph, but the first band is at apex of second basal cell, there is an additional brown costal spot between the second and third bands, the third band begins at apex of second vein, etc.

Trypeta (*Aciura*) *aplopappi*, n. sp., ♂ ♀. Black, the pleura largely brown, the head and its appendages, the legs except the coxæ, yellow, a brown vitta on outer side of front femora; knob of halteres bright red; bristles black, the short pile light yellow; front bearing four bristles each side, the scutellum bearing only two; abdomen shining, not bristly; ovipositor flattened only at apex, as long as last two abdominal segments; wings of nearly an equal width, dark-brown, the following spots whitish hyaline: two in costal cell, two in marginal cell beyond apex of first vein, the second spot extending half-way across the submarginal cell; one in first basal cell opposite apex of first vein, one in upper outer angle of discal cell, a basal spot and oblique streak crossing second posterior cell, five in third posterior cell, three of which are on the wing margin; from two to four in axillary angle; first vein bristly, the others bare; length, 4 mm. Southern California. Three males and two females, which issued in April and May from irregular galls, about 8 mm. long by 4 in diameter, on the smaller branches of *Aplopappus pinifolius*.

The wings are very similar to Figure 8, Plate X., of Loew's Monograph, but there is no hyaline spot in the first posterior cell, only one in the first basal, axillary angle not wholly hyaline, etc.

Trypeta (*Carphotricha*) *cultaris*, n. sp., ♂ ♀. Agrees in all respects with Loew's description and figure of *culta* (Monographs, etc., III., pages 276 to 279) with these exceptions: Ovipositor not longer than the last three abdominal segments; wings having only one brown ray between apices of second and third veins; no darker spot in second posterior cell; length, 6 to 7 mm. Southern California. One male and two females, in January.

These differences are constant in the numerous specimens examined but not now before me. So far as I am aware, the typical *culta* does not occur on the Pacific coast.

Trypeta (*Neaspilota*) *signifera*, n. sp., ♂ ♀. Yellow, dorsum of thorax and metanotum except the sides, opaque grayish-black, the abdomen sometimes brown; front bearing five bristles each side, the scutellum bearing four; ovipositor flattened, as long as the last three abdominal segments; wings hyaline, basal half or less of space between apices of auxiliary and first vein brown; first vein bristly, the others bare; length, 3 mm. Southern California. Six males and one female.

The wings are like Figure 10, Plate XI., of Loew's Monograph, except that the apex of the stigma is broadly hyaline.

Trypeta (*Tephritis*) *baccharis*, n. sp., ♂ ♀. Yellowish-brown, base of each abdominal segment and spot each side of middle of metanotum, dark grayish-brown; front bearing four bristles each side, scutellum also bearing four bristles; wings narrow, of nearly an equal width, opaque white mottled with brown, which is broken up into spots, except a border on the apex beginning between apices of first and second veins and extending nearly to axillary angle, where the brown is very faint; along the wing margin this border contains a white spot in each angle of the sub-marginal cell, entire apex of the first posterior cell, three spots in apex of second posterior cell, and seven between this cell and the axillary angle; the brown spots form an indistinct broad band, reaching from the stigma to the wing margin at lower end of the posterior cross-vein; first vein bristly, the others bare; length, 5 mm. Southern California. Nine males and seven females, which issued from January to April from irregular oval galls about 12 mm. long by 4 in diameter, on tender twigs of *Baccharis viminea*.

The wings somewhat resemble Figure 5, Plate XI., of Loew's Monograph, but are much paler, the darker portions forming two cross-bands, one near the middle, the other at the apex of the wing.

Trypeta (*Euaresta*) *Californica*, n. sp., ♀. Black, the head and its appendages, corners of thorax, margin of scutellum, large spots on pleura, and the legs, yellowish, halteres pink, pleura near the wings, and bases of the latter, tinged with pink; thorax and scutellum opaque gray pollinose, abdomen glabrous, shining; front bearing four bristles each side, the scutellum bearing only two; ovipositor longer than the last three abdominal segments, over three times as broad at base as at the apex; wings

brown, the following spots hyaline: four in costal cell (none between apices of auxiliary and first veins); three in marginal cell, situated between apices of first and second veins, three in sub-marginal cell of which one is contiguous to the middle spot in marginal cell and two are between apices of second and third veins; three in first posterior cell, the one in the apex reaching the wing margin, three in second posterior cell, all of them contiguous with the wing margin, four in third posterior cell, of which three are along the wing margin; three in axillary cell, two in the second basal, two in first basal, of which one is sub-basal and the other near its apex, also one in discal cell near its apex; first vein bristly, the others bare; length, nearly 4 mm. Southern California. A single female, in May.

The wings closely resemble Figure 23, Plate X., of Loew's Monograph, but there is only one hyaline spot in the discal cell, four in the third posterior, etc.

Trypeta (*Euaresta*) *araneosa*, n. sp., ♀. Grayish-black, the head and its appendages (except a portion of the occiput), halteres and legs except sometimes a portion of the femora, yellowish; bristles black, the short pile yellowish; front bearing four bristles each side, scutellum bearing four bristles; wings brown, the following spots hyaline: three in costal cell nearly filling that cell (none between apices of auxiliary and first veins), four in marginal cell, of which two are near the base and two between apices of first and second veins; five in sub-marginal cell, of which one is at the base, two near the middle and two between apices of second and third veins; five in first posterior cell, the one in the apex reaching the wing margin; three in the second posterior cell, each of which crosses that cell; four in third posterior cell, from four to seven in the discal cell, one of which touches the vein at the base of that cell; and three in first basal cell; second basal, anal and axillary cells largely hyaline; first vein bristly, the others bare; ovipositor scarcely longer than the last abdominal segment; length, 4 mm. Southern California. Four females, in January and February.

The wings somewhat resemble Figure 21, Plate X., of Loew's Monogragh, but the stigma is wholly brown and the base of the wing to apex of auxiliary vein is almost wholly hyaline, excepting a brown streak crossing the third posterior cell near its base.

Trypeta (*Euaresta*) *stelligera*, n. sp., ♂. Black, the head and its appendages (excepting the occiput) the halteres and legs, yellow; thorax

and scutellum gray pollinose, the abdomen glabrous, shining; front each side and the scutellum bearing four bristles; wings brown, the following spots hyaline: four in costal cell (a yellow dot on costa just beyond apex of auxiliary vein), two in marginal cell situated between apices of first and second veins, three in sub-marginal cell, of which two are between apices of second and third veins and the third is contiguous to the first spot in marginal cell; three in first posterior cell, the one at apex reaching the wing margin; four each in second and third posterior cells, three in each cell reaching the wing margin; three in first basal cell, of which two are near its base and the other near its apex; and one in discal cell near its apex; second basal, anal and base of axillary cells largely hyaline; first vein bristly, the others bare; length, 4 mm. Southern California. A single male specimen.

The wings resemble Figure 23, Plate X., of Loew's Monograph, but there is no hyaline spot just before apex of second vein, only one in the discal cell, etc.

Trypeta (*Euraesta*) *tapetis*, n. sp., ♂ ♀. Yellowish, the dorsum of thorax, lower part of pleura, metanotum and ovipositor, black, the abdomen sometimes marked with blackish; scutellum bearing four bristles; wings brown, the following spots hyaline: two in costal cell, one between apices of auxiliary and first veins; four or five in marginal cell, of which two or three are between apices of first and second veins; four in sub-marginal cell, of which two are between apices of second and third veins, that at tip of second vein encroaching on the marginal cell; four in first posterior cell, of which one is near the base and three near its apex, one of the latter spots sometimes being divided into two spots; three in second posterior cell, each reaching the wing margin, but two of these spots are sometimes merged into one; four in third posterior cell, three of which reach the wing margin; three in first basal cell, and two in discal cell, of which one is near its base and the other near its apex; second basal, anal and base of axillary cell largely hyaline; first vein bristly, the others bare; length, 4 mm. New Mexico (E. L. Keen). Four males and two females.

The wings somewhat resemble Figure 28, Plate X., of Loew's Monograph, but the hyaline spots are larger and more numerous, some of them merging into each other so as to form a cross-band, beginning just before apex of auxiliary vein, and reaching the wing margin just beyond apex of sixth vein.

THE ODONATA OF ITHACA, N. Y.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Most of the species recorded below were collected by the writer in the vicinity of Ithaca, N. Y., during the years 1888 and 1889. I have seen the collections of others, and have found in them some forms that I had not collected. I have also examined the collection of Cornell University, and found several species not previously seen from the locality. This list is not complete, as undoubtedly more species will be found in the Cordulidæ and Gomphidæ. I have added a few notes on certain species and genera, which I thought opportune :—

CALOPTERYGIDÆ.

Calopteryx maculata, Beaur. Common about streams during spring and summer.

Hetærina americana, Fabr. A specimen was taken during the past summer by a Mr. Salant.

AGRIONIDÆ.

Lestes hamata, Selys. Uncommon, August.

Lestes rectangularis, Say. Common during July and August.

Lestes disjuncta, Selys. Uncommon, August.

Lestes forcipata, Ramb. Not common, June.

Argia violacea, Hagen. Common, July.

Argia putrida, Hagen. Common, summer.

Ischnura verticalis, Say. Common, July, August.

Amphiagrion saucium, Burm. One specimen.

Nehalennia irene, Hagen. Uncommon, July.

Erythromma condita, Hagen. One specimen.

Enallagma exsulans, Hagen. Quite common, July, August.

Enallagma Hageni, Walsh. A specimen in the Cornell Univ. collection is probably this species.

Enallagma ebria, Hagen. This has the superior appendages of ♂ deeply bifid, more so than in *E. civile*, the upper branch no longer but a little larger than the lower. A black spot above on segment two, and the black of segment three confined to the tip. Two specimens.

Enallagma annexa, Hagen. The ♂ has the apical black spot on segment two, and the apical halves of three, four and five are black; eight and nine are blue. The superior appendages rounded, blunt at apex, inferior pointed, as long as the superior. Two specimens, August.

These, together with those recorded and described by Calvert in his recent paper on the Odonata of Philadelphia, are all the species of this genus found in the northeastern part of the United States, except *E. traviata*, Selys. This was described from Mass., I have collected a specimen on Long Island, N. Y. It is hardly more than a variety of *E. aspersa*. The superior appendages are like *E. aspersa*, except the lower branch is a little heavier; the black on segment two has a projection to the anterior margin of the segment, and the black on segment three also reaches to the anterior margin in a point; apical half of seven, all of eight and nine and all of ten, except black spot above, blue. I have also taken *E. divagans* on Long Island.

GOMPHIDÆ.

Ophiogomphus rupinsulensis, Walsh. I took two specimens.

Dromogomphus spinosus, Selys. One specimen in Cornell Univ. collection labelled "N.Y,"; it is probably from Ithaca. It has been collected quite commonly at Baldwinsville, N. Y., by Mr. R. H. Pettit.

Gomphus fraternus, Say. I have but one specimen.

Gomphus villosipes, Selys. Not uncommon.

Gomphus exilis, Selys. Quite common in June and July.

Gomphus parvulus, Selys. One specimen.

Gomphus, sp. A specimen (♀) in Cornell Univ. collection, unknown to me.

Hagenius brevistylus, Selys. A specimen in the Cornell Univ. collection.

ÆSCHNIDÆ.

Anax junius, Drury. Common during summer.

Neuræschna vinosa, Say. I have one specimen, 29 July.

Æschna heros, Fabr. In Cornell Univ. collection, June.

Æschna constricta, Say. Common during July and August.

Æschna clepsydra, Say. Uncommon, August.

CORDULIDÆ.

Macromia transversa, Say. Uncommon, June, July.

Epitheca elongata, Scudd. One specimen in Cornell Univ. collection, June.

Cordulia princeps, Hagen. In Cornell Univ. collection, June.

Cordulia cynosura, Say. Common in the spring.

Cordulia semiaquea, Burm. In Cornell Univ. collection labelled "N. Y."; it is probably from Ithaca; Mr. Pettit has taken it at Baldwinsville, N. Y.

Cordulia, sp. ? I have an abnormal female near *C. cynosura*, but the hypertriagonal space of forewings crossed, the sectors barely united at apex; all the triangles crossed, no internal triangle to hind wings, three or four veinlets under the pterostigma, black spots at base of the wings, abdomen shorter than hind wings, sides of thorax without any stripe. This and *Nannodiplax vacua* may serve to illustrate how fickle are the venational characters in this family; it would be better, I think, to draw generic characters from the head and thorax.

LIBELLULIDÆ.

Tramea lacerata, Hagen. I saw two specimens of this species at Freeville (a town ten miles from Ithaca), May 31, 1889; after much trouble I captured one of them.

Celthemis elisa, Hagen. One specimen collected by Prof. Morgan.

Libellula quadrimaculata, Linn. A few specimens in the Cornell Univ. collection.

Libellula pulchella, Drury. Common during spring and summer.

Libellula basalis, Say. Uncommon, August.

Libellula trimaculata, De Geer. Common during spring and summer. This is usually placed in the genus Plathemis, which differs from Libellula only in the male genital organs, which, I think, are hardly worthy of generic rank.

Mesothemis longipennis, Burm. Common during spring and summer. I have a specimen with the triangles four-sided.

Mesothemis simplicicollis, Say. I have seen a specimen collected by Mr. O. Takahashi.

Diplax vicina, Hagen. Not uncommon, July, August.

Diplax rubicundula, Say. Common during spring and summer.

Diplax semicinta, Say. Uncommon, August.

Diplax intacta, Hagen. This is placed in the genus Leucorhinia, Britt., separated from Diplax only by structure of the vertex of head; the venational characters vary to the usual form of Diplax. Not uncommon in the spring.

NOTES ON NOCTURNAL LEPIDOPTERA.

BY A. R. GROTE, A.M., BREMEN, GERMANY.

THE SPECIES OF LITHOPHANE.

Prof. Smith says that he uses the name *Xylina* in preference to *Lithophane*, because both are catalogue names and *Xylina* has priority, since the Verzeichniss was not published until 1818 at least. My argument is, that Ochsenheimer took the name *Xylena* from Hübner's Tentamen (1808), cites Hübner and includes his type *lithoxylea*, which is not a *Lithophane*, but a *Hadena*. Consequently, *Xylina* or *Xylena* falls before *Hadena* and should not be used for this genus. I took *Lithophane*, because it thus has priority for this genus, and because it includes *socia*, which I designated as the type in 1874, being free to do so. It seems to me this course is clear. Ochsenheimer, as I have proved, admits the Tentamen as valid authority, and adopts Hübner's names out of it in a number of instances. The authority of the Tentamen is most certainly established by Ochsenheimer's action and its prior date proved. See my Buffalo list, and my papers in CANADIAN ENTOMOLOGIST on this subject. From an æsthetic point of view *Lithophane* is a more descriptive and a prettier name, although this is no argument and a mere opinion of my own. The fact is, that Ochsenheimer's *Xylina* is a mixed genus; its true type, since this author cites Hübner, is a *Hadena*. Thus it cannot, under the rules, be used for the present structural type.

I have little to add to what Prof. Smith says as to the synonymy of the species. I did not identify *signosa*, if I recollect rightly, from the collection, but while I was in Buffalo, from a study of the description in the British Museum Lists. If I made a mistake, as would now appear, it is an excusable one. But what I do not understand is Fernald's testimony, Bull. Geol. Surv., Vol. 5, 201, 1879. From this it appears that my *petulca* was "near, if not identical with Walker's *infructuosa*," a species now referred by Smith as a synonym of *confusa*, Hübner! An entirely different looking insect! Prof. Fernald does not mention my *signosa*, Walk., specifically, but says: "The only *Xylina* which I found in the Walkerean collection, under a different name from what they are known by us, was *Xylina antennata*, Walk. This is *X. cinerea*, Riley." I had only noted, in 1867, this gray species, but when I came to separate our gray forms, I found three of them, and the question was, which one of these Walker had. From my memory of the type and from Walker's description, I felt sure it was *cinerea*, and, in this instance, Prof. Fernald

is corroborated by Prof. Smith. I do not know whether Prof. Fernald had *signosa* with him, but one thing is clear, that if he had this or *petulca*, then he could not have failed to note the fact, if *petulca* was really identical with Walker's original type of *signosa*. He *had petulca*, and he considered it near or identical with *infructuosa*, Walk.! Now, has there been here any shifting of Walker's "types"? If Prof. Fernald had my *signosa* with him in 1879, then its correspondence with Walker's *signosa* would be proved inferentially by his general statement quoted above. If, again, he saw the type of *signosa*, he could not have failed to note its correspondence with the *petulca* he certainly had with him! Why did Prof. Fernald compare *petulca* with *infructuosa*, if Walker's "type" of *signosa* was *petulca?* As a matter of fact, what Walker says agrees better with *signosa* than with *petulca*; I have no sufficient material now before me to go into this point. Walker's description convinced me that he had what I call *signosa* before him when I determined and compared our species with his text, but I am aware that much better descriptions than Walker ever wrote are liable to be misinterpreted. Nor am I primarily interested to rescue my name. I wish to show reasons for assuming that the Walker collection is not now, in all its details, what it was before Mr. Butler took charge and merged my collection with it in 1883. And I insist that Walker's text must not conflict with the present "types" when we are called upon to identify the two. Perhaps, in the present case, Prof. Fernald has some additional information to that which he gathered for me and kindly communicated in 1879. At any rate, Prof. Fernald's published remarks (l. c.) should be read in the light of Prof. Smith's present references.

Lithophane unimoda, Lintner.—This may be a distinct species, but the single specimen I saw impressed me with the probability that it was only a dark, suffused form of one of the species of the *antennata* series.

Lithophane gausapata, Grt.—I believe the specimen was sent me by my friend Behrens. Why the type "should" be in Mr. Neumoegen's collection I do not know, except that I gave him all my material before leaving home. I believe he has it and also the type of *Mamestra ferrealis*, unless I gave it to some one else—Prof. Smith, perhaps.

Lithophane deposita, Morr.—The specimens in my collection, or, at least, one of them, came from Mr. Morrison, and are thus authentically named, if not "types." This same is true of *fagina* and *curvimacula* in my collection.

Lithophane oriunda, Grt.—If the "type" is not in British Museum, Prof. Saunders may have it. This species was, I believe, authentically determined by me for Mr. Geo. Norman, and his specimen may be in the British Museum.

Lithophane Bethunei, G. & R.—It is of little importance now, since the species is so well known, but I believe our type is in Philadelphia. Mr. Robinson gave our collection to the Central Park Museum, and Mr. Beutenmüller can probably testify as to what "types" of *Noctuidæ* it may contain. "Types," from which a figure was made, might lose their labels, and may not have been reclaimed by us.

Lithophane capax, G. & R.—I wish to mention this species because I took my own original material in 1867 with me to Vienna and showed it to Julius Lederer, the well-known European authority on the *Noctuidæ*, and asked his opinion on the generic location of the insect. He said of all the European genera the moth came nearest to *Xylina*. I have been of the opinion for a very long time that its position here was only tentative.

Euharveya carbonaria, Harvey.—When Dr. Harvey described this species, I very much doubted its reference to *Lithophane*. As I have lost the pleasure of naming a genus after him, through Mr. Walker's *Siavana*, I propose the present term for *carbonaria*, which Prof. Smith says affords a remarkable structural character. According to my view, the moth approached my genus *Ufeus*.

AGROTIS MURAENULA.

I am not prepared to admit, without further study, the validity of the generic disintegration of the species of *Agrotis*. It does not seem to me probable, for instance, that *occulta*, for which I retained *Eurois*, Hübn., should be congeneric with *pellucidalis*. But all such questions, together with the proper names according to the rules which these new groups must bear, may be left to the future monographist. They do not affect the present case, which is this, that two species, properly referred by me at the time to *Agrotis*, were described by Walker under the same specific name *vetusta*. One of these turns out to be, as I had suggested in my essay, *muraenula*, G. & R., and this latter name, I claim, under the custom and as accepted in Staudinger's Catalogue, should be retained for the species it designates, since at the time it was free to be named and no subsequent generic separation can overturn its real and conceded right at the time it was proposed. *Vetusta*, Walk., as applied to *muraenula*, must be relegated to the synonymy.

AGROTIS OPIPARA.

When Mr. Morrison described his *opipara* and *scropulana* from Mt. Washington, I was working out the theory with regard to the influence of the Glacial Epoch, or Epochs, upon the geographical distribution of to-day of our lepidoptera. It was a matter of less interest that Mr. Morrison should have redescribed known species, than that these species from Mt. Washington should have a representation also far away in the higher latitude of Labrador, or that Labrador forms should be demonstrated to occur also on mountain peaks in New Hampshire. Mr. Moeschler sent me specimens of his *islandica* and *carnea* from Labrador, and when Mr. Morrison also sent me his "types" of *opipara* and *scropulana* I compared them and found the two species from Mt. Washington the same as the two from Labrador. I exhibited all these specimens at the meeting of the Entomological Club of the American Association for the Advancement of Science, and there is record of the fact in the CAN. ENTOMOLOGIST. I adopted then Mr. Moeschler's names for these insects, having no opportunity to go behind his determination and suspecting no necessity. Matters rested in this way until I had the opportunity, when I found, and was the first to find, that the real *islandica*, Stdgr., from Iceland was probably different from *islandica*, Moeschl., from Labrador, as well as from *opipara*, Morr., from Mt. Washington; the two latter being, as I had originally claimed, the same species. Accordingly in 1882, in my New Check List, p. 25, I called our North American species *opipara*, Morr., with *islandica*, Moeschler, in error, as a synonym. I added this note :—"This species from Mount Washington is identical with the Labradorian species determined by Moeschler as *islandica*. But I have doubts, since seeing an Icelandic specimen, as to whether Moeschler is right. In restoring *opipara* for this species I do not in the slightest way change my opinion as to the identity of the Mount Washington and Labradorian species." Nothing can be clearer than my words and action. I was bound to accept Moeschler's authority in the first instance since I could not but believe he knew Staudinger's species and Mr. Morrison knew neither that nor *carnea*. Eight years later comes Prof. Smith and (although I never had, at any time or anywhere, described any North American species as *islandica*, and although, whenever I mentioned the name, it was perfectly clear I was speaking of the species identified by Moeschler) cites after *opipara*, "*islandica*, Grote, in error." Prof. Smith goes still further. He

suppresses my reference of the species described by Moeschler as *islandica* to *opipara*, in 1882, as cited above, and has the courage to write "the error is Mr. Grote's for condemning Mr. Morrison's species on insufficient grounds!" By also suppressing Moeschler's original determination, I am brought in for a synonym I never committed! In effect what I really did was this: I identified the two species described by Moeschler from Labrador and Morrison from Mt. Washington as the same, which was a clear scientific gain. I am also the first to show that Moeschler's name for the species was the result of a wrong identification, and that our North American species must be called *opipara*, Morr., with *islandica*, Moeschl., nec. Stdgr., as a synonym! In 1885, three years after my rectification, Mr. Smith writes (Ent. Am., I., 14,) that "Mr. Moeschler's claim that *islandica* is found in Labrador is based on a variety which is certainly the *opipara* of Mr. Morrison." Here was the place to say that I had made the correction and arrived at the conclusion in my note printed in 1882! I think I may say that I have been anxious that every real mistake I have made should be rectified for the sake of science and that I have never shunned a just criticism. But, in view of facts like the preceding, it will appear that an author may allow himself to publish a criticism the reverse of just and without any apology for his conduct.

PACHNOBIA CARNEA.

It is a matter of comparatively little consequence now whether Mr. Morrison redescribed *carnea* or the closely allied *Wockei* from Labrador. If the supposed "type" in Tepper coll. is alone genuine, he will have redescribed the latter; if the two (?) specimens he sent me at the time are genuine "types," he will, I think, have described *carnea*. In order to make out the former the true case, Prof. Smith omits Mt. Washington as locality for *carnea* in his Revision, and gives it only to *Wockei*. I do not feel sure the two are really different and am quite certain Morrison did not distinguish them. He sent me at the time to Buffalo a cigar box half full of specimens, all "types" of his *scropulana*, for my opinion. I wrote him they were very beautiful, but varied so much I could not believe well they were all one species. I was instructed to return them at once and did so without taking them out of their places, retaining only one or perhaps two of the dingiest specimens, which were specially marked for me, and which, on comparison, I identified with *carnea*. Now, long afterwards, and without knowledge of the facts, Prof. Smith appears and writes as if he knew all about Morrison's "types," pronounces a

single one in coll. Tepper as genuine, while conceding elsewhere that Mr. Morrison was very liberal in labelling specimens as "types." To conclude, in the Synonymic Catalogue the locality for *carnea*, Mount Washington, re-appears! On whose authority if not on mine based on Morrison's specimens? What has happened between the Revision and the Catalogue? Has Prof. Smith seen my specimens sent by Morrison and found them really *carnea?* In the Synonymic Catalogue several of my *Agrotis* species are reinstated, and perhaps finally my determination of these two Alpine forms may gradually come to be acknowledged. Where an examination of my collection has resulted in establishing my determinations so very largely, it seems hardly worth while to pursue the subject further. There remain but a few cases of specific determination where I am still of a different opinion from the author of the Synonymic Catalogue, and I reserve my views on these until a proper time.

AGROTIS EXSERTISTIGMA.

This species was described by Mr. Morrison on material furnished by me and credited to me, and I figured, in the Buffalo Bulletin, the specimens returned as "types" of *Exsertistigma* by Mr. Morrison. But it appears that one of my specimens was not returned me, that this specimen, also marked as "type" of *exsertistigma*, found its way into Mr. Tepper's possession, and that this specimen belongs to a species afterwards described by me as *observabilis*. It may be truly said that Mr. Morrison's original description was totally inadequate, and that therefore the species should remain as figured and determined by myself. There is nothing to prove the Tepper specimen the genuine one, and mine not genuine. My publication was the only sufficient one. Probably, almost certainly, Mr. Morrison considered them all the same, in which case my determination was decisive. If Mr. Morrison considered my specimens credited to me and Mr. Tepper's one species, I was free to determine one as *exsertistigma* and re-describe the other (of the existence of which in Mr. Tepper's collection I was, however, ignorant). I think, with justice, my original determination should prevail. But my original determinations have been overturned by Prof. Smith; only this author has overlooked the fact that his new name for my *exsertistigma*, viz., *confusa*, must fall before *Morrisonistigma*, proposed by me in Buff. Bulletin.

THYATIRA ANTICOSTIENSIS.

I would draw attention to the fact that this form of *T. pudens*, Guen., taken by Mr. Wm. Couper on Anticosti, is described by me, CAN. ENT.,

XVIII., 215, 1886. My specimen is, I believe, now in the British Museum, and, I think, unlabelled. It is apparently a hoary, boreal form of *pudens*, but may also be restricted to Anticosti. I have not had sufficient material to decide the question.

SPHIDA OBLIQUA, Walk.

Prof. Smith has shown that my identification of our *S. obliquata* with this species of Walker's is correct, and the species must be known as above. I separate *Sphida* from *Arzama*, or, as it must be now known, *Bellura*, on account of the clypeal tubercle, exactly as *Ochria*, Hübn., (= Gortyna, Auct.,) is separable from *Gortyna*, Hübn., (= *Hydræcia*, Auct.) As I use an acknowledged generic character, I do not see why it should here fail of recognition. In some way, now incomprehensible to me, I failed to see Walker's species in 1867, when I was there with a specimen to identify. The drawer may have been overlooked, or the species not then in place—probably the latter, as Mr. Walker was then employed in arranging the material. I saw then the type only of *Arzama densa*, and recognized it at once as allied to our species of Sphida. I did not then know *vulnifica*, which I described in 1872 in Philadelphia. I left my type there and there it must yet be. The type of *densa* did not recall to me *vulnifica*, which is more yellow; I have all along thought these were two species; one "reddish," smaller perhaps, *densa*, and another, *vulnifica*, differently coloured. Of this latter I regarded *melanopyga* as a variety with blackish anal tuft. I did not see the type of *Bellura gortynoides*, Walk., C. B. M., 32, 465; the description more resembles *vulnifica* than that of *densa* does. As I have not seen my type of *vulnifica* to compare with my material or with *melanopyga*, it should be found and studied. I have now myself no, or little doubt, we have to do with a single variable reddish on yellow species, and that Prof. Smith's synonomy will be found to be correct, p. 181, where the name is mispelled *gortynides*. (Other cases of miswritten names are: *tranquila*, for *tranquilla; synochites*, for *synochitis; appasionata*, for *appassionata*, etc.) From this variable brighter coloured species, *Bellura diffusa*, Grt., is totally distinct. It has been collected by Mr. Moffat, I believe, in Canada. Where my type is now I cannot for the moment recollect. It seems not to be in the British Museum. A type of *Sphida obliquata* is or was in the Central Park Museum. The *Arzaminæ*, then, are a group of noctuid genera with aquatic larvæ, having affinities with *Nonagria* and of a peculiar Bombycid appearance, owing to the tufted female abdo-

men, like *Lasiocampa*, *Ocneria*, *Bombyx*, etc., and soft brown colours. They are exclusively American and seem to be the survival of an ancient form of the family. The two genera may thus be catalogued :

BELLURA, Walk.

GORTYNOIDES, Walk.
densa, Walk.
vulnifica, Grt.
var. melanopyga, Grt.

DIFFUSA, Grt. — SPHIDA, Grt.

OBLIQUA, Walk.
Obliquata, G. & R.

A TERATOLOGICAL TRIO.

BY W. HAGUE HARRINGTON, OTTAWA.

For those interested in teratology I wish to record three instances of malformations of the antennæ of Coleoptera. The beetles presenting these have been kindly given to me by Mr. W. Simpson, an energetic and observant young collector of this city. The deformities exhibited are as follows :—

Fig. 6—*a*. Right antenna of a male *Dytiscus Harrisii*, in which the third joint is enlarged and broadened toward the tip and gives off two branches. The inner of these contains eight joints and is quite normal in appearance, but the outer consists of only two articles, of which the second is short and irregular at apex, and does not seem to have had any more attached to it.

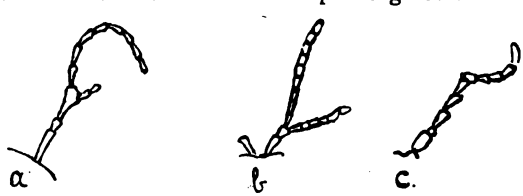

FIG. 6.

b. Right antenna of *Adimonia cavicollis*, in which the second joint is somewhat enlarged and gives off two branches. The inner branch consists of the full nine joints necessary to complete the organ, but these joints are all slightly shortened and broadened, and the branch has a subclavate appearance. The outer branch is imperfeet; the first four joints are still more shortened, and are succeeded by two irregular articles, the first of which evidently represents at least two.

c. Right antenna of *Desmocerus palliatus*, in which the sixth joint is represented by a small wedge-shaped piece. The seventh is short and thickened, and is set at right angies to the fifth, thus making a sudden bend in the antenna. This malformation is probably due to an injury while the insect was in the pupa state, as indicated by fragments of skin which remained when the beetle moulted.

COCCINELLIDÆ OF DODGE CO., WISCONSIN.

BY WILL EDWIN SNYDER, BEAVER DAM, WIS.

Anisosticta strigata, Thunb. Very abundant, found under stones, bark and other objects in nearly all pasture and meadow lands. I have never taken it while feeding. A colony of over fifty was taken from under one stone the past summer.

Megilla maculata, D. G. Abundant—to be found nearly everywhere. Most abundant in the late fall in corn fields infested with the chinch bug. One of our earliest beetles to appear in the spring. Also to be taken during warm spells in midwinter, seven specimens having been taken on the eighteenth of January of the present year.

Hippodamia glacialis, Fab. I have two of this species taken from under bark of a stump in 1891. It is the only record I have of its occurrence here.

Hippodamia 13-punctata, Linn. Our most abundant species of the Coccinellidæ. Especially abundant in corn fields in company with *M. maculata*, *H. parenthesis* and *C. sanguinea*. Varies much in colour and markings. Doubtless very destructive to the chinch-bug, as it occurs most frequently in fields infested by it.

Hippodamia parenthesis, Say. Common, especially so among the loose bark and rotted wood on old oak stumps.

Coccinella 9-notata, Hbst. Abundant, most so early in the spring, when large quantities can be taken from under stones and other material lying in pastures. Varies in colour and markings.

Coccinella sanguinea, Linn. Not so abundant as *C. 9-notata*. Found in largest numbers in oat fields just before harvest.

Anatis 15-punctata, Oliv. Abundant, found feeding upon the leaves of various shrubs. Noticeable here from the fact it is seldom found in the interior of timber lands, preferring the vegetation along the borders, especially on the north side. Larvæ and pupæ always to be found if an adult can be.

Psyllobora 20-maculata, Say. I have three specimens in my cabinet, all being found under stones in a pasture, two taken in 1892 and one in 1893.

Chilocorus bivulnerus, Muls. The "twice stabbed lady bug" cannot be called common here. During five years I have not taken more than 25 specimens.

Hyperaspys undulata, Say. Occasionally taken, though it can hardly be classed as common.

Scymnus analis. I have three specimens in my cabinet which Dr. Riley identified as *analis.*

In conclusion, I wish to thank Dr. Riley for his valued assistance in naming the above species.

CORRESPONDENCE.

WINTER HABITS OF SOME COLORADO PROCTOTRYPIDÆ.

Sir,—In the review of Mr. Ashmead's work on the Proctotrypidæ in the last number of this paper, a method for obtaining some of the species in winter was mentioned. During a winter's collecting, mostly beneath stones, boards, etc., I have found the following species (determined by Mr. Ashmead) occurring quite frequently :—*Pantoclis montana*, Ashm. *Pantoclis coloradensis*, Ashm., *Tropidopria torquata*, Prov., *Tropidopria simulans*, Ashm., *Tropidopria*, sp., and *Aclista*, sp. In some localities the species first mentioned occurs quite abundantly.

CARL F. BAKER, Fort Collins, Colo.

CONCERNING CALOTARSA ORNATIPES, TOWNSEND.

Sir,—In the February number of the CAN. ENT , Prof. Townsend described and figured a peculiar fly under the above name. The figure of the hind tarsus at once reminded me of a fly I had collected some years ago at Ithaca, N. Y., and on comparing find that it is a specimen of *Calotarsa ornatipes.* But I had not considered the fly as a Syrphid, as its characters are opposed to almost everything of important value in the Syrphidæ. Not only in the absence of a spurious vein and the open first posterior cell, as mentioned by Prof. Townsend, but in the small basal cells, the presence of several prominent macrochætæ on the thorax, and the terminal *arista* to antenna. Some Syrphidæ have a terminal *style*, but an *arista* is different. Moreover, the origin of the anterior veins of the wings is unlike that of the Syrphidæ. Besides there are spurs at the tips of the intermediate tibiæ.

I am not a Dipterologist ; but my specimen is labelled " Platypeza," which, I think, is correct. In this position the fly is not so anomalous and remarkable as when placed in the Syrphidæ. NATHAN BANKS.

Mailed March 13th.

The Canadian Entomologist.

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NEW NORTH AMERICAN HOMOPTERA.—NO. VII.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

1. IDIOCERUS AMŒMUS, *n. sp.*

Allied to *I. suturalis*, but smaller. Female of a uniform pale yellow colour, pronotum and scutellum tin gedwith fulvous or ferruginous, the former with a spot behind the inner angle of each eye and a median vitta, pale. Mesonotum with a black band bordering the scutellum, at least posteriorly; extreme tip of scutellum yellow. Elytra hyaline very slightly tinged with fulvous, becoming smoky toward the apex; nervures pale yellow. Wings hyaline, highly iridescent. Eyes rufous. Oviduct ferruginous.

In this species the front is more strongly narrowed apically with the sides nearly rectilinear beyond the antennæ, not so distinctly arcuated as in *I. suturalis*; and the clypeus is less expanded at apex. The last ventral segment is very feebly rounded behind, not distinctly advanced at the middle as in *suturalis*. In one example the pronotal markings are obsolete and the oviduct pale. Length, 5 mm.

Described from two female examples. One taken near Los Angeles Cal., by Mr. D. W. Coquillett. The other, a more deeply coloured specimen, was sent me by Mr. C. P. Gillette, as an inhabitant of the mountains of northern Colorado. Mr. Coquillett's specimen came labelled *Idiocerus amœmus*. Uhler., a M.S. name which is quite appropriate to this pretty insect.

2. PEDIOPSIS SORDIDA, *n. sp.*

Closely allied to *P. tristis*, but smaller. Male: Greenish grey, closely and coarsely punctured with blackish; punctures on the face irregularly disposed; those of the pronotum deep, elongated and oblique, but rather less conspicuous than in *insignis* and *tristis;* median line distinct. Scutellum pale with the basal angles commonly fuscous. Elytra deep smoky-brown; nervures strong, concolorous. Abdo-

men, breast and legs piceous-brown; the knees, outer edges of the tibiæ, broad hind margins of the ventral segments and valve, and the base of the plates, whitish. In pale examples the legs are fulvous and the venter and plates almost uniformly ashen-grey. Length, 4 mm.

Female: Larger. Grey tinged with fulvous-yellow. Elytra concolorous, subhyaline, with inconspicuous nervures, and with the head, pronotum and scutellum irregularly mottled with brown; the basal angles of the latter blackish; punctures concolorous and less distinct than in the male. Legs and all beneath brown, the outer surface of the femora and the tibiæ more or less invaded with fulvous; the abdominal segments and genital pieces broadly margined with whitish; or the lower surface may be entirely pale yellow with no trace of the brown markings. Length, 5 mm.

Colorado. Described from two male and five female examples collected among the Rocky Mountains by Prof. C. P. Gillette. This sombre species seems to be very unstable in its colouring, varying from a uniform pale yellow beneath to deep brown banded and marked with whitish. The females are well distinguished by a peculiar dusky mottled appearance above and the evenly punctured head; and the dusky basal angles of the scutellum in both sexes.

3. AGALLIA CONSTRICTA, *n. sp.*

Closely allied to *A. 4-punctata*, Prov., but smaller and more slender. Length, 3–3½ mm.

This species can best be characterized by a comparison with *4-punctata*. Female: Face a little more elongated than in that species; the front more gradually narrowed to the apex and not so broad at the base of the clypeus; clypeus more narrow and slender; outer edge of the cheek less deeply excavated under the eye, the edge between the eye and outer angle shorter, and the angle less prominent. Pronotum proportionately longer, with the latero-posterior margin distinctly longer and the posterior angles more prominent. Elytra narrower, especially toward the apex, the costa not so strongly arcuated, the apical areoles longer and narrower. Last ventral segment more produced and narrower behind, outer angles much depressed against the base of the pygofers, subtectiform, with a triangular flat basal area. In *4-punctata* there is a small oval depression on either side scarcely invading the basal half of the segment and leaving a central ridge and usually the apical margin

elevated. Pygofers shorter than in *4-punctata* and scarcely exceeded by the oviduct which in its ally is distinctly longer. In the male the front is as strongly constricted below the antennæ as in the female, while in *4-punctata* the constriction is very slight; and the outer angles of the cheeks in the male *constricta* are almost obsolete. Plates more slender than in *4-punctata*, triangular at base, narrow and parallel beyond with their rounded apex not attaining the tip of the pygofers.

Colour and markings substantially as in *4-punctata:* Yellowish testaceous, marked and clouded with fuscous. Sutures of the face, apical disc of the clypeus, an oval mark on the front, a longitudinal line from the basal angle of the front continued over the vertex and to the apex of the scutellum, four spots on the pronotum—two near the apex, and two at the humeral angles—a dot on the vertex against the eye and another on each ocellus, fuscous-brown. Two round spots on the vertex, two more on the disc of the pronotum posteriorly, and the antennal pits, black. Pectoral pieces and legs more or less clouded with brown. Elytra fuscous with pale nervures. Abdomen more or less fuscous or even black in some males, the genital pieces pale.

The colours are paler in the females. Sometimes the fuscous markings are almost obsolete above, but the four black spots on the vertex and pronotum seem to be constant.

New Jersey, Mississippi, Florida. Described from numerous examples received from Mr. Howard Evarts Weed, Prof. J. B. Smith, and others. This appears to be a common species in the Southern States, where it replaces *A. 4-punctata.*

4. AGALLIA UHLERI, *n. sp.*

Allied to *sanguinolenta* but more slender. Pale greyish-brown tinged with yellow, especially beneath. Two round dots on the vertex, the basal angles of the scutellum and two oblique marks on its apical field, sometimes continued forward as an interrupted median line, a cloud on the pectoral pieces, the tergum, its margins excepted, and sometimes the base of the vertex, black. Front brown, with pale lateral arcs, or pale with brown arcs. Elytra subhyaline, with distinct brown nervures. Front a little longer and narrower than in *sanguinolenta.* Last ventral segment of the female deeply and widely cleft, the lateral lobes rounded. Genital characters of the male about as in *sanguinolenta.* In deeply-coloured specimens the pronotum shows four longitudinal vittæ, the apex of the

head has a brown cloud, the ocelli are rufous and some of the elytral nervures are broadly interrupted with white. Length, about 3 mm.

Colorado, Arizona, California. Described from ten examples representing both sexes. This plain little insect I have received from several correspondents labelled *Agallia venata*, Uhl., and *Agallia enervis*, Uhl., and two highly-coloured examples from California came with the name *Agallia longula*, Uhl. The Californian material was received from Mr. Coquillett; those from Arizona were from the Morrison Collection, and the specimens from Colorado I owe to the kindness of Prof. C. P. Gillette.

Mr. Uhler's M. S. name, *venata*, would be appropriate for this species, but it is too near the European *venosa*. The other names, *enervis* and *longula*, are inapplicable to the more typical examples, so I have taken the liberty of applying to it the name of the well-known scientist who first recognized the species.

5. THAMNOTETTIX ATRIDORSUM, *n. sp.*

Allied to *Th. inornata*. Female: Pale yellow, washed with green above, especially on the pronotum and elytra. Beneath tawny yellow, or whitish on the venter; disc of the tergum, at least basally, the metasternum and basal segment of the venter commonly, tip of the rostrum, sides of the oviduct and two spots, sometimes coalescing, on the middle of the apical margin of the last ventral segment, black. Elytra subhyaline, a little smoky at apex, in some examples quite strongly washed with greenish; nervures strong, greenish. Wings hyaline, iridescent. Vertex produced and quite strongly angled before, length at the middle twice that next the eye and nearly equal to that of the pronotum; median impressed line distinct to beyond the middle. Front rather broad, showing about six pale brown arcs above. Clypeus scarcely widened toward the rounded apex, sides rectilinear. Cheeks obtusely angled and longitudinally wrinkled externally. Eyes and antennal setæ pale brown. Sides of the pronotum short, carinate. Last ventral segment long and narrow, sides regularly arcuated from the truncated apex to the base. Length, 4½ mm.

Colorado. Described from three female specimens received from Prof. C. P. Gillette. This species is proportionately broader and shorter than *Th. inornata*, the pronotum is shorter and more concave behind and

the elytra are shorter and their nervures stronger than in that species.

Two larger individuals (6 mm. in length), apparently not distinct from the above, are broader with a wider front and a shorter and more obtuse vertex. They are both females.

6. ATHYSANUS SEXVITTATUS, *n. sp.*

Form of *A. comma* nearly. Greyish, tinged with yellow, especially on the head. Vertex with the impressed median line brown; marked either side on the disc with transverse oblong brown spots; apex polished, pale yellow with an elongated black mark on either side reaching over on to the base of the front; ocelli pale with a blackish dash on either side. Pronotum with six longitudinal brown vittæ and a few irregular marks before. Scutellum with two discal dots, two basal spots, and sometimes a double cloud on the apical field, brown. Elytral areoles edged with fuscous; nervures thick, soiled white. Front brown, its broad base and a few broken arcs pale; sutures of the loræ brown. Tergum black at base, the sides and about four apical segments pale, the latter with two broad obscure longitudinal brown vittæ terminating in a black spot either side on the large polished yellowish genital segment, or these vittæ may become geminate by the intrusion of a longitudinal pale line; sides of these pale apical segments with a row of black dots. Venter and disc of the valve dark brown; connexivum, hind edge of the ultimate segment, edge of the valve, plates and pygofers, soiled yellow or clouded with dusky; the pygofers with a large blackish cloud beneath toward their apex. Anterior and intermediate femora twice banded, and the posterior lineated with brown; tibiæ with brown dots. Vertex flat, edge subacute; length on the middle one-third greater than that next the eye. Front regularly narrowed to the apex. Clypeus not widened apically. Pronotum short, hind edge nearly straight, anterior edge feebly rounded. Elytra short ovate, reaching to the penultimate dorsal segment. Valve rather large, obtuse at apex; plates oblong, widened at base, their apex truncated; pygofers large, blunt at apex, surpassing the plates. Length, 3½ mm.

Colorado. Described from two males received from Prof. C. P. Gillette. This species is most nearly allied to *A. comma* in most of its characters, but it has the colours and markings, almost, of *obsoletus* and *extrusus*. Only males are known to me.

THE LIFE HISTORY OF RIVULA PROPINQUALIS, GN.

BY E. PORTER FELT, B. S., FORT PLAIN, N. Y.

This rather common moth seems to have attracted little attention, though the larvæ are voracious feeders. The moths may be seen flying over grass lands in the afternoon and early evening during June, July and August. They are attracted to lights but very little, only a few being taken in the trap-lanterns at* Ithaca, N. Y., in 1889.

The moths deposit their eggs singly, or in scattered clusters of five or six. The eggs are a pale straw colour, and are firmly attached to blades of grass. This insect does not appear to be very prolific: out of seven or eight females under observation, none laid over fifteen or twenty eggs and most of them laid only eight or ten.

The eggs hatch in about five days. The larvæ escape from the egg by eating nearly around the upper surface of the shell and pushing up the lid thus formed. (Fig. 7.)

FIG. 7.—Lateral and top view of egg; the latter showing the micropyle and the lid that the larva forms as it makes its way out of the egg. Greatly enlarged.

The remains of the shell are not molested. When first hatched the larvæ are a pale yellowish colour and with long fuzzy hairs on the back; the hairs are longer at the extremities and incline well over the head. The young larvæ begin feeding at once and soon they are a bright green colour. When not feeding the larvæ remain quietly upon the surface of the leaf. In this position they harmonize so well with their surroundings that it is difficult to detect them, even when in plain sight. Frequently the best way to find them is to look for injuries to the grass. When very young the larvæ feed upon the upper surface of the leaf, eating only the soft parenchyma of the leaf. When about two weeks old they greedily devour the whole leaf. Besides eating considerable, the larvæ also waste much by cutting leaves off as they feed. The larvæ rarely move except in search of food unless disturbed, when they usually drop to the ground.

Larvæ coming from eggs laid in August moult three times before hibernating. When cold weather approaches the larvæ crawl down near the

* The work upon which this paper is based was done at the Insectary of Cornell University.

base of a grass stalk and remain quiet till the warmth of spring arouses them. After their long exposure and fast, their colours are perceptibly duller and the body is much shrunken. The larvæ soon regain their normal size and colouring. In the spring there are at least two moults. The larvæ pupate the latter part of June. The pupa state lasts about five days. The pupæ are bright green, striped with white. They lie in loose white cocoons, which are attached to blades of grass.

The moths that emerged the latter part of June laid eggs. The larvæ from these eggs completed their growth about July 13, and July 20 a second generation of moths emerged, the round of life being completed in thirty days. It is probable that a third generation occurs in the month of August. At least it is possible and in harmony with what is known, because the moths are quite common in August, and there is no evidence to show that the moths live more than two weeks.

Egg.—A pale straw colour; form an oblate spheroid; short diameter, .36 mm.; long diameter, .42 mm. There are numerous ridges; micropyle complex. (Fig. 7.)

Larva, first stage.—Head diameter, .2625 mm.; body diameter, .1875 mm.; length, .9375 mm. Head cream coloured; body a pale yellow. There are several rows of minute tubercles on the body, and from each tubercle a light-coloured hair grows. The hairs are longer at the extremities of the body, and give the larvæ a fuzzy appearance. There are five pairs of prolegs, occurring on the seventh to tenth and thirteenth segments inclusive.

Larva, second stage.—Head diameter, .3875 mm. The body is more hairy and the colour a deeper green.

Larva, third stage.—Head diameter, .6875 mm. The body is a bright green, and the hairs are relatively shorter than in the preceding.

Larva, fourth stage.—Head diameter, .849 mm. The larva has two prominent dorso-lateral ridges, which are marked with white stripes.

Larva, fifth stage.—Head diameter, 1.2 mm. Markings the same as in the preceding.

Larva, sixth stage—Head diameter, 1.8 mm. The larva has two narrow creamy-white subdorsal stripes in place of one broad one; hairs dark coloured.

Pupa.—Length, 9 mm. Colour bright green with two white stripes on the dorsum, extending from the head to the tip of the abdomen.

Cocoon.—Very thin, loose and white.

NOTES ON THE LIFE HISTORY OF ARGYRIA NIVALIS, DRURY

BY E. PORTER FELT, B. S., FORT PLAIN, N. Y.

This moth was rather common at Ithaca, New York, in 1892 and 1893. The moths fly in the afternoon and early evening of the latter part of June and most of July. They are attracted to lights to some extent, but those taken are mostly males. The eggs are laid in clusters upon blades of grass. They are firmly attached to the leaf, and the five or six in a cluster over-lap more or less.

The eggs hatch in ten or twelve days. The young larvæ were placed in a cage containing grass, clover and considerable moss. They soon disappeared, and subsequent observation proved they had constructed cylindrical nests in the moss The nests were composed of bits of moss and were smoothly lined with silk. Some of the nests were perpendicular, others were horizontal. The larvæ devoured all the moss before any perceptible amount of grass was eaten. After the grass was eaten they began on the clover, and soon not a green thing was left in the cage.

When about a month old the larvæ are 2. cm. long, and their nests are three to four centimetres long. At this time the nests are mostly above the surface of the ground. There seem to be no indications of more than one generation a year. They probably hibernate in their nests as larvæ, and in the spring complete the round of life much as do some species of *Crambus*.

FIG. 9—Egg and micropyle. Greatly enlarged.

Egg.—Yellowish-white, flattened, oval, 1.2 mm. by .87 mm. Shell finely reticulated. (Fig. 8.)

Larva, first stage.—Head diameter, .33 mm.; body diameter, .27 mm.; length, 1.65 mm. Head and thoracic shield jet black. Body a straw colour with a broad transverse carmine stripe on the fifth and seventh segments. Spots of the same colour occur on the eleventh and twelfth segments, and also just above each pair of legs. Five pairs of prolegs, occurring on the seventh to tenth and thirteenth segments inclusive.

PREPARATORY STAGES OF CATOCALA RETECTA, GROTE.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .035 inch by .02 inch high. Low conoidal, so much flattened as to be somewhat lens shaped, ribbed longitudinally with 37 striæ, 18 of which reach the micropyle, the striæ marked transversely with shallow cross striæ. Colour, dull olive. Duration of this period, 221 days.

Young larva.—Length, .13 inch. Of the usual shape, that is cylindrical with the head broader than the body, and the first two pairs of prolegs short and not used in walking. Pale-yellow or brownish-yellow, the anterior part of the body darker than the posterior, head and top of joint 2 dark brown. Duration of this period, 5 days.

After first moult.—Length, .20 inch. Same shape as before. Head and a small place on the top of joint 2 black. Body pale dull-green; three reddish purple stripes or lines on each side; piliferous spots small, a short gray hair from each one. Duration of this period, 6 days.

After second moult.—Length, .35 inch. Body striped with alternate stripes of white and purplish-black, three white lines on each side outside of the dorsal stripe, this stripe being made up of a narrow line each side of a more or less clearly defined blackish centre. The white on the sides in lines about a third as wide as the dark, all greenish tinged. Head black, with no markings unless it be indistinct mottlings at the upper part; piliferous spots small, black; venter sordid white with black spot in the centre of each joint. Duration of this period, 8 days.

After third moult.—Length, .65 inch. Of the usual shape, a slight fringe on each side. Colour dark; three stripes on each side and one dorsal, made up of two black lines enclosing a pale centre that is composed of a pale lilac-gray line with a central broken black line, the dorsal line containing very little of the central black; the stripes separated from each other by a narrow light stripe that is slightly creamy, with a little pale lilac mottlings in places, the light stripe lighter than the light lines in the dark stripes; a stigmatal stripe that is made up of the ground colour of the venter mottled with black, though not heavily; venter sordid white with a black patch in the centre of each joint; lateral fringe white, not very heavy; head black, with a few whitish lines that do not reach the apex, some of them broken; legs pale, mostly pale reddish, the anal and last prolegs darkest. Duration of this period, 5 days.

After fourth moult.—Length, .85 inch. Marked and striped as before, but the lines broken into dots, and the light a pale green in the pale stripes and a pale greenish-lilac in the darker stripes; head with no green; joints 2 and 13 with very little green; fringe more copious, about 15 to each joint on each side; head about as before; piliferous spots pale orange, the posterior pair of dorsals to each joint more or less black, these on the posterior part of the body wholly black, while on the anterior part of the body only a part of each spot black; the lateral spots similar. Duration of this period, 6 days.

After fifth moult.—Length, 1.25 inches. Striped with dorsal, suprastigmatal and substigmatal pale, and subdorsal and stigmatal dark stripes, the ground colour a pale whitish with a slight greenish tinge; the dorsal stripe is made up of two broken purplish-black lines that make a series of ellipses, the whole stripe making from one to two ellipses on each joint, and in these ellipses there is a broken line of purplish-gray outside the general black line; the separation between the stripes is a broken purplish-black line, that is much broken into dots in pale examples and less so in dark ones. The make up of the suprastigmatal stripe is two dark broken lines alternating with three broken pale ones, this scarcely distinguishable in the paler forms; piliferous spots orange, a brown hair from each; head striped with black and sordid white; venter white, with black patch on each joint. Duration of this period, 6 days.

After sixth moult.—Lenth, 1.90 inches. Ground colour pale green, rather dull, with a slightly pinkish tinge over joints 5 to 8 and the anterior half of 9 and a little over 11 to 12. General colour rather a dark gray; stigmatal and subdorsal stripes and the central part of the dorsal mottled with black, with broken black bordering lines, the black in dots and elongated dots that easily group into rows; central part of suprastigmatal like the dorsal only not quite so distinct black, each with a row outside the central black of dull reddish that is between a reddish-brown and purplish-red; substigmatal stripe with a dark lower part and a paler upper part containing its reddish line; joints 2 to 4 and posterior part of 9 and anterior part of 10 with all the mottlings black, so that these parts are darker than the rest of the body, especially is this the case with joints 9 and 10; posterior part of joint 12 slightly elevated; piliferous spots, dorsal and part of upper row of lateral red with whitish tips, the others mostly whitish with a little red at base; head with a black stripe

from above the antennæ and eyes one each side to the apex where it is a little more purple, mottled slightly with whitish, the rest of head dull dark lilac with whitish stripes that are as usual moniliform, with a dull purplish-orange stripe across these on the apex; venter white with a black patch in each joint; fringe rather copious, whitish with a faint lilac tint. These characters will answer for the mature larva, with the addition that at the time of pupating it was 2.50 inches long. Duration of this period, 21 days.

Chrysalis.—This is of the usual shape of the genus. Length, 1.10 inches; diameter, .34 inch; length from head to end of wing and tongue case, .70 inch, these extending to posterior part of joint 5; cremaster slender, ending in two small hooks, with a few more small ones at the base. Colour chestnut-brown, covered with a white powder. Duration of this period, 28 days.

The eggs were obtained September 11, 1892, from a moth in confinement, one of the darkest of the forms of Retecta. Two were carried through to the imago state and produced moths that were not so dark as the parent, though not quite so light as some of the lightest forms, about half way between *Retecta*, as Mr. Hulst describes it in Buffalo Bulletin, vol. 7, page 53, and his *Luctuosa*. In CAN. ENT., vol. 24, page 19, I have referred to these two forms, stating that I regarded them as only one species from my observations of them in the field. My raising intergrades from the dark form shows that they are identical. The fact is the early fresh specimens are a combination of the light form and intergrades with some dark forms, while later as they become worn the dark forms predominate. I want to say again that *Flebilis* is not a variety of *Retecta*, but a smaller species and an insect of different habits from *Retecta*, although feeding on the same food-plant. I have taken hundreds of them and have never seen one grading towards *Retecta*. In fact it is one of our most constant species.

The total period of the preparatory stages of *Retecta* were 306 days, but this would of course vary with the deposition of eggs of different examples in the woods. The food-plant is hickory. The one described through its changes emerged July 22, 1893. My field notes record the capture of *Retecta* in 1892 from August 5th to September 24th, which will give a fair range of its appearance here.

NOTES ON PIERIS AND ANTHOCHARIS.

BY HARRISON G. DYAR, NEW YORK.

After reading Mr. J. W. Tutt's note on page 47 of CAN. ENT., I have looked over many of our species of Pieris and Anthocharis with the following result :—Our genus Pieris is probably entirely pure and congeneric with the European. The majority of our species of Anthocharis are congeneric with *Euchloë cardamines*, as figured by Mr. Tutt, but some species are different and should be removed from the genus. I have not examined seven of the species given in Prof. Smith's list, but those which I have seen separate in synoptic form as follows :—Mr. Tutt's nomenclature of the veins differs from that in use here, as will be seen by a comparison of my figures (Figures 9 and 10) of *Anthocharis sara* with the figures on page 47 of CAN. ENT.

§1. *Fore-wings with 11 veins.*

Veins 6 to 8 on a stalk ; vein 9 absent ; veins 10 and 11 arising from discal cell.

Vein 8 very short—nearly absent.

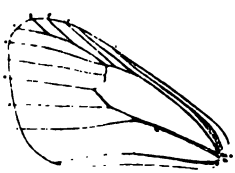

FIG. 9.

Pieris monuste, *P. beckerii*, *P. sisymbri*, *P. occidentalis*, *P. protodice*, *P. napi* vars. *hulda*, *oleracea* and *venosa*, *P. rapæ*, *Nathalis iole*.

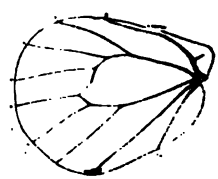

FIG. 10.

Vein 8 moderately long.

Neophasia menapia, *Tachyris ilaire*.

Anthocharis lanceolata, *A. cethura*.

Veins 6-10 on a stalk ; vein 9 absent ; vein 11 from discal cell.

Anthocharis genutia.

§2 *Fore-wings with 12 veins.*

Veins 6–10 on a stalk ; vein 11 from cell.

Anthocharis ausonides, *A. olympia*.

A. coloradensis, *A. hyantis*, *A. creusa* [1].

Veins 6–9 on a stalk ; veins 10 and 11 from cell.

Anthocharis creusa [2], *A. sara*, *A. julia*, *A. Morrisoni*, *A. stella*.

NOTES ON PARNASSIUS CLODIUS.

BY JOHN B. LEMBERT, YO SEMITE, CALA.

After a journey of ten miles over snow and snowbanks from four to eight feet deep, I arrived in the latter part of June, on my summer and fall collecting ground on the Fuolumne Meadows, which lie on the edge of the area wherein the high Sierra species of Lepidoptera are most numerous. The *Parnassius* was one of the first I began to collect, as the butterflies had just commenced to issue, and were flying in the grassy and shaded timber-covered portions of a rocky side hill slope. After they were out a day or so they began to settle down on flowers to feed, and were then less difficult to catch. The first day I only caught three, and kept on adding a few more to that number every day. Towards three and four p. m. they camp for the night on low bushes and a low growing sedge (Carex filifolia) and rise only when disturbed by ants or the collector on his return towards camp. I have in this way taken a great many females. On the 6th of July a ♀ after a hard chase up a rocky elevation lit on the sand and walked upon a Phlox cæspitosa and deposited an egg; she then flew to another and deposited an egg there also. I dug up both plants and put them in a box, placing the insect in same box, but when I got to camp she was missing. On July 10th I secured an egg that a ♀ laid on Carex filifolia. The same ♀ attempted to oviposit on a slender a plant of *Gayophytum diffusum* that it bent backwards down on the ground, which caused her to fly on others with the same result. Shortly after I saw several ♀'s do the same thing. One female [illegible] a bush by a ♀, as soon as he left she flew to a [illegible] a large boulder, and tacked an egg on its side. I marked the spot and secured the egg, only to be crushed before I got home the next day, and the one on the carex was also lost. Towards the latter part of July ♀'s were ovipositing on the Pinus Murrayana [illegible] on the ground, and also on carex. Not being able to find the eggs on the pines, I soon [illegible] away. Not long after another ♀ did the same thing and finally deposited on a piece of rotten wood. After the [illegible] results as the preceding ones and on the rotten wood, I could see nothing but a small crevice; but in [illegible] found the egg. This unravelled the mystery why I could not find the eggs on the pine burrs.

NOTE ON THE PROPOSED NEW GENUS CALOTARSA.

BY C. H. TYLER TOWNSEND, JAMAICA, W. I.

On pp. 50–52 of the present volume of this journal, I described the new genus and species *Calotarsa ornatipes*, which I then supposed to be an anomalous syrphid. I am now convinced that it is a platypezid. At the time of writing the paper, which was sent in in the fall of 1892, I overlooked the ciliate alulae of the wings, the apical spur of middle tibiæ, and the similarity of venation with the Platypezidæ.

I was led to place it in the Syrphidæ from its extreme resemblance in structure and coloration to that family, the only venational character in which it was actually aberrant being the open apical cell. There is no doubt now, however, of its true position. Credit is due to Mr. Coquillett for suggesting to me *in litt.* its affinities with the genus *Platypeza*, to which he referred it, at the same time raising the question as to whether it could be possible that the peculiar tarsal appendages were of extraneous vegetable origin. I am very certain that the appendages of the hind tarsi are not of extraneous origin. They are exactly similar to each other on both the right and left tarsi. As to the validity of the genus, it is, barring the neuration, quite as unique as before supposed. It is much larger than any known Platypezidæ, which range from 1½ to 3 mm., or at most 4 mm., and its colouring is quite different from what is usual in that family. It does not agree in the structure of its hind legs with *Platypeza*, to which genus it most nearly approaches in venation. In *Platypeza* the femora, tibiæ, and tarsi are evenly widened and thickened in the hind legs. In *Calotarsa* the hind femora and tibiæ are hardly at all widened or thickened, while the tarsi are greatly widened, flattened and winged. It is also removed from *Platypeza* s. str. in certain neurational and antennal characters, for which see description, and in the prominent hypopygium. It may be looked upon as a gradation between the two closely related families, the Syrphidæ and the Platypezidæ, clearly located in the latter but with a leaning in the direction of the Pelecocerini tribe of the former.

NOTE.—Since writing the above, Prof. J. M. Aldrich has sent me drawings of the tarsi and wing of a similar species of *Calotarsa*, which he caught on a window at Brookings, So. Dakota. The specimen is a male, and less than 5 mm. long. From the drawings I believe it to be a distinct species. The venation is quite the same, except that the posterior branch of fourth vein does not quite reach the wing margin, which I am inclined

to consider a good specific character, following Schiner as Prof. Aldrich suggests. The tarsi differ in four main points: The third tarsal joint is not so widened; the expanded base of the appendage of first joint is wider and shorter, not so narrowed; the two black disks of appendage of third joint are not circular, especially the terminal one which is pointed-oval, and the membraneous expansion of the same appendage occupies a reversed position on the main stalk, being on the anterior side of it, instead of on the posterior as in *ornatipes*. It is to be hoped that Prof. Aldrich will publish the drawings of his species, together with a description of it.

NOTES ON NOCTURNAL LEPIDOPTERA.

BY A. R. GROTE, BREMEN, GERMANY.

AGROTIS ALBALIS.

My types of *albalis*, now in collection Brit. Mus., belong to a western species showing a charactertistic white downy surface of the primaries, obscuring the ornamentation. My single type of *cloanthoides* in coll. Graef. belongs to a smooth-winged form with distinct, sordid or brownish-black Cloantha-like markings. It does not appear that *albalis* has an European representative, while *cloanthoides* is not unlike *Agrotis signifera*, of which latter it may be the American representative. In his revision Prof. Smith unites *albalis* and *cloanthoides*, apparently on the evidence of a worn example labelled *albalis* in the Bailey collection, and which he claims to be really *cloanthoides*. Thus it seems that the *albalis* of the revision is virtually *cloanthoides*, and Mr. Smith does not know in that work the true *albalis*. I have a recollection of the rubbed specimen in the Bailey collection which is labelled *albalis;* but whether it is one of the original lot or whether I named it during a visit to Albany, I cannot now say. Probably the former, and that I did not recognize it as distinct. When I described *albalis*, I did not know yet *cloanthoides*, and so it might be that a worn specimen of *cloanthoides*, with the markings lost, might have been wrongly labelled by me, escaping special notice among several *albalis*. But now in the synonymic catalogue Mr. Smith has seen my types and the real *albalis*, and considers *cloanthoides* as at least a good variety. In my opinion there is little doubt that the two are specifically distinct. Apparently Prof. Smith does not recognize colour as a character of a true variety, and when a form intergrades with the type he refuses

the varietal name. So he will not recognize red *specialis* as entitled to a varietal name in contradistinction with olive-coloured *Wilsonii*, and yet a more glaring contrast in appearance can hardly be found. It is generally characteristic of varieties that they intergrade, and of species that they do not. Non-intergrading varieties would seem to be on the road to species.

AGROTIS SEMICLARATA.

I believe, eventually, that this form will be found to represent a distinct species from my *A. vancouverensis*. The hind wings beneath are distinctly half-pale Mr. Smith says: "The figure in the Illustrated Essay is very characteristic and recognizable, and renders determination easy. Butler says it is the ♀ of *vancouverensis*, but I have seen both sexes of the form." Well, if Mr. Smith has seen both sexes of *semiclarata*, how can it be treated as a mere synonym of *A. vancouverensis*, Grt.? One would think that it must be a variety at least. I expect, indeed, that time will show that *vancouverensis (=agilis?)*, *semiclarata*, *clodiana*, all three thrown together as one in the Revision, will prove to be, as I stated originally, three distinct species. In several cases its author has been obliged to change his decisions. This happens not unfrequently in this world when one has little consideration.

AGROTIS DOCILIS.

I had only a single ♀ type of this species expanding 48 mil., from Professor Snow, Colorado. This is referred as a variety to *perexcellens*, Grt., in the Revision, p. 144. Prof. Smith says: "*Docilis* is based on a large specimen in which lilac predominates. The fine series before me proves its identity with the normal form of *perexcellens* in which the pale colours are gray and yellowish." I have not the slightest hesitation in accepting this reference as correct. I say in my description: "Large sized, resembling *perexcellens* (etc.) in the markings. Lilac gray over blackish fuscous," etc., Bull. Geol. Surv. VI., 259. I never had but the one specimen, and if a specimen of another species of *Agrotis* bears the label "*docilis*" it is the result of accident, at the moment unexplainable by me. At the time, and just because I only had the one specimen, I had my doubts about its distinctness, but the colour was so different that I concluded I had to do with another species. *Docilis* should thus be referred as a colour variety of *Perexcellens*.

NORTH AMERICAN THYSANURA—V.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

In a previous paper there were given analytical tables to the genera of the families Aphorouridæ and Poduridæ; in the present paper will be found a table to the families and a table to the genera of the Entomobryidæ. The Smynthuridæ and Papiridæ are each represented by a single genus.

The families recognized can be separated by means of the following table:—

A. Furcula* wanting.....*Aphoruridæ.*

AA. Furcula present.

B. Furcula attached to the ventral side of the antepenultimate abdominal segment.....*Poduridæ.*

BB. Furcula attached to the ventral side of the penultimate abdominal segment.

C. Abdomen elongate, cylindrical, much longer than broad.....*Entomobryidæ.*

CC. Abdomen globular, but little longer than broad.

D. Terminal segment of the antennæ long, ringed . . .*Smynthuridæ.*

DD. Terminal segment of the antennæ short, with a whorl of hairs . .....*Papiriidæ.*

ENTOMOBRYIDÆ.†

Antennæ with from four to six segments; eyes present or wanting; postantennal organ wanting; abdomen cyclindrical, much longer than broad; tarsi with two claws; furcula always present, attached to the penultimate abdominal segment.

A. Body naked or clothed with hairs.

B. Antennæ four-jointed.

*Furcula is the name used by Tullberg for the ventral spring, the basal segment is the manubrium, the middle segment the dentes, and the apical segment the mucrones.

†Schott describes the following new species from California, and adds several European species:—*Entomobrya nivalis*, Linn, p. 16. *E. multifasciata*, Tullb. = *D. decemfasciata*, Pack, p. 17. *E. marginata*, Tullb, p. 17. *Sira purpurea*, Schott, p. 17. *Drepanura californica*, Schott, p. 19. *Orchesella rufescens*, Lub., p. 21. *Isotoma viridis*, Bour. var. *aquatilis*, Luh. = *I. tricolor*, Pack, p. 22. *I. palustris*, Muller, p 22. Also the following Poduridæ and Aphoruridæ:—*Achorutes viaticus*, Tullb., p. 23 *A. armatus*, Nic. = *marmoratus*, Pack, p. 23. *Xenylla maritima*, Tullb., p. 24. *Lipura inermis*, Tullb. = *L. fimetaria*, Pack, p. 24.

Schott Beitrage zur Kenntniss Kalifornischen Collembola, Bihang Kongl. Svens. Vet. Akad. Hand. Bd. 17. Afd. IV. No. 8, pp. 1-24, 1891.

C. With a single eye-patch on each side of the head.

D. Third and fourth abdominal segments subequal above.

E. Dentes not extending beyond the ventral tube....*Isotoma*, Bourl.

EE. Dentes extending beyond the ventral tube . *Corynothrix**, Tullb.

DD. Fourth abdominal segment three or four times longer than the third.

E. Mucrones falcate, not with an anteapical tooth..*Drepanura*†, Schott.

EE. Mucrones not falcate, with an anteapical tooth.

F. Eyes arranged promiscuously, not in two straight longitudinal and four transverse rows.....*Entomobrya*, Rond.

FF. Eyes arranged symmetrically, in two straight longitudinal and four transverse rows.....*Salina*, MacG.

CC. With two eye-patches on each side of the head. *Sinella*, Brooks.

BB. Antennæ six-jointed.....*Orchesella*, Temp.

AA. Body clothed with flattened scales.

B. Antennæ four-jointed.

C. Apical segments of antennæ ringed.

D. Eyes present, twelve, six on each side of the head. *Tomocerus*, Nic.

DD. Eyes wanting..... ....*Tritomurus*, Frau.

CC. Apical segments of antennæ simple, not ringed.

D. Eyes wanting.....*Beckia*, Lub.

DD. Eyes present, sixteen, eight on each side of the head.

E. Mesonotum simple, head exposed.....*Seira*, Lub.

EE. Mesonotum projecting over the head and in part concealing it.....*Lepidocyrtus*, Bour.

BB. Antennæ five-jointed.

C. Eye spot with a single ocellus; apical segment of the antennæ ringed..... .....*Templetonia*, Lub.

CC. Eye spot with eight ocelli; apical segment of the antennæ simple..... .....*Strongylonotus*, MacG.

*Tullberg erected this genus for the reception of a species from Nova Zembla, *C. borealis*, Tullb. The characters separating it from *Isotoma* are certainly superficial.

†As the description of this genus may be inaccessible to many, it is appended: "Mesonotum non prominens. Segmentum abdominale quartum triplo vel quadruplo longius quam tertium. Antennæ dimidia parte corporis breviores, quadriarticulatæ, articulo secundo et tertio inter se fere aequalibus, quarto omnium longissimo. Ocelli 16; 8 in utroque latere capitis. Pili clavati praecipue in regione cervicis et in segmentis apicalibus stipati. Mucrones furculae parvi falciformes. Squamæ? Type, *Drepanura californica*, Schott.

*Salina**, gen. nov.—Eyes sixteen, arranged in two straight longitudinal and four transverse rows ; antennæ four jointed, twice as long as the head, segments subequal ; tarsi with two claws ; third and fourth abdominal segments unequal ; body naked. Type, *Salina Banksii*, sp. nov.

Salina Banksii, sp. nov.—Light olive ; a line between the antennæ, the eye spot, a line down each side of the body, blackish-purple ; underneath olive ; antennæ purplish, with a dark ring at the apex of the three basal segments, segments much lighter at base, hairy ; legs long, slender, light olive washed with purplish, densely covered with long bristles ; claws short, blunt, without teeth, inner half the length of outer ; tenant hair wanting ; furcula long, slender, white, bristly ; the mucrones small, divided, the upper part bowed, the end truncated, and with two notches, the lower rounded, ovate. Length, 1.25 mm.

Habitat : Florida, (Nathan Banks, collector).

Named after my friend, Mr. Nathan Banks, of Sea Cliff, Long Island, New York.

Strongylonotus†, gen. nov.—Ocelli sixteen, eight on each side of the head ; antennæ five-jointed ; tarsi with two claws ; mesonotum projecting over the head ; third and fourth abdominal segments unequal ; body covered with scales. Type, *Strongylonotus Summersii*, sp nov.

Strongylonotus Summersii, sp. nov.—Head small, white, eye spot black; antennæ long, slender, densely covered with long hairs, attached to the head at the apex of the eye spot, first and second segments subequal, white, third segment subequal to the second, much narrowed towards the apex, white, apex with a purplish ring, fourth segment subequal to the third, the basal half expanded, ovate, light purplish, the apical half dumb-bell shaped, with the sides distinctly hollowed out, black, appearing as a distinct segment, apical segment two-thirds the length of the fourth, black, basal two-thirds dumb-bell shaped, not so distinctly so as the apex of the fourth, apical third enlarged at base, pointed at apex, slightly incurved on the outside; side of the mesonotum, the most of the second and all of the third abdominal segments, and a broad band across the apex of the fourth, purplish ; legs long and slender,

*Derived from the name of a village.

† στρογγύλος, rotundus ; νωτος, dorsum.

densely hairy, similar to those of *Salina Banksii*, white, except the apex of the hind coxæ, and the hind femora, except at apex, purplish-black ; claws slender, outer one-fourth longer than inner, with two teeth, inner more slender than outer, without teeth ; tenant hair present ; abdominal segments unequal, first indistinct, second and third subequal, fourth eight or ten times longer than third ; furcula white, long, stout, densely hairy beneath, reaching beyond the ventral tube ; manubrium broad, with a purplish stripe down each side, reaching about the middle of the fourth abdominal segment, with several spines at apex ; dentes about as long as the manubrium, smooth, lateral hairs twice the length of ventral, serrate beneath ; mucrones one-half longer than broad, with a stout terminal hook and a basal denticle. Length, 3.5 mm.

Habitat : El Pilur, Venezuela. (Summers, collector).

Named after Prof. H. E. Summers, of Champaign, Illinois.

Smynthuridæ.*

The following table will probably be found useful in separating the species of *Smynthurus*. All the species are included except *quadrisignatus*, Pack., which is not certainly known and not sufficiently characterized to be placed from the description :—

A. Abdomen not with a dorsal spine.
B. Furcula not with laterally developed bristles.
C. Abdomen not black with white spots.
D. Fourth segment of the antennæ not ringed..... *minutus*, n. sp.
DD. Fourth segment of the antennæ distinctly ringed.
E. Fourth segment with six sub-segments..... *hortensis*, Fitch
EE. Fourth segment with more than six sub-segments.
F. Fourth segment with eight sub-segments..... *ferrugineus*, Pack.
FF. Fourth segment with more than eight sub-segments.
G. Fourth segment with nine sub segments.
H. Size small ; colour deep delicate roseate..... *roseus*, Pack.
HH. Size moderate ; colour black with lighter markings *elegans*, Fitch.
GG. Fourth segment with ten sub-segments..... *arvalis*, Fitch.
CC. Abdomen entirely black with four small dorsal white spots.

*Schott adds the following :—*Smynthurus eisenii*, Schott, p. 7. *S. luteus*, Lub., p. 11. *S. niger*, Lub., p. 12. *S. plicatus*, Schott, p. 13.

D. Head between the antennæ wholly black..*quadrimaculatus*, Ryder.

DD. Head between the antennæ black with two white spots.....*sexmaculatus*, Harvey.

BB. Furcula with a row of long bristles on both sides of the dentes, fan-like.....*spinatus*, MacG.

AA. Abdomen with a dorsal spine.....*floridana*, MacG.

Smynthurus minutus, sp. nov.—Black and yellow; head yellow, except behind and the eye spots, which are black, black extending around on the side of the face below the eye spots; eye spot narrowly encircled with yellow; on each side below the eye spot, three clear spots arranged in a transverse line; a black speck, ocellus-like, on the vertex between the antennæ; antennæ reaching beyond the apex of the thorax; basal segment black, globular, one-half the length of the second; second segment subequal to the third, yellow, petiolate at base, naked; third segment about one-half the length of the fourth, enlarged at middle, yellow, with a few scattered hairs; fourth segment yellow, blunt at tip, moderately hairy, not ringed; thorax black, except a small part of the sternum, which is yellow; legs short, stout, yellow; claws short, outer claw about as long as the tibia is broad, sinuate beneath, with a single tooth, inner claw two-thirds the length of outer, broad, stout, with a single tooth above; three tenant hairs present; abdomen black, except a yellow spot on the underside of the anal tubercle, naked, except a few bristles on anal tubercle; furcula slender, slightly hairy beneath; manubrium reaching the middle of the anal tubercle; dentes subequal in length to the manubrium; mucrones one-third the length of dentes, simple, pointed, with a slight hook at apex, with a high power appearing very finely serrate. Length, 1 mm.

Habitat: Ithaca, New York.

Collected by Mr. R. H. Pettit under pieces of wood in a plant jar in the University Insectary.

PAPIRIIDÆ.*

Papirius purpurescens, sp. nov.—Blackish purple; head between the antennæ washed with yellowish, second segment of the antennæ (remainder wanting) and the claws white or transparent; the remainder of the body, including the entire furcula, blackish purple; basal article of the antennæ very short, one-third the length of the second; legs long, slender,

*Schott adds a single species, *Papirius maculosus*, Schott, p. 14.

hairy; claws short, stout, outer broadly rounded, with two teeth, one at middle, the other at base, inner claw nearly as long as outer, more slender, with two bristles at tip; tenant hairs present; abdomen slightly hairy, more abundant at apex, anal tubercle with a few scattered fringed clavate hairs; furcula long, slightly hairy above; manubrium extending half its length beyond the apex of the abdomen, stout; dentes subequal to the manubrium in length, narrowed beyond the base; mucrones one-fourth the length of the dentes, apex blunt, slightly serrated at middle Length, 3 mm.

Habitat: Sea Cliff, Long Island, New York. (Banks, collector).

Readily recognized by the purple legs and furcula.

Papirius olympius, sp. nov.—Reddish, spotted with dark brown, in young specimens purplish; eye spot black; vertex covered with stiff bristles; a longitudinal brown band extending from the back of the head to the eye spot, another in the middle of the vertex, extending down the middle of the front; antennæ nearly as long as the body, purplish, hairy, basal segment light at base, dark at apex, one-fourth the length of the second, second one-half the length of the third, third segment slender, with seven sub-segments at apex, fourth segment with six sub-segments; abdomen and thorax with two sinuate brown bands on each side of the dorsum, the middle ones meeting at the apex and base of the thorax, and on the basal half of the abdomen, also a band extending from this basal transverse band of the abdomen along the middle of the back towards the head, bilobed in front, a triangular spot just before the apex of the abdomen and promiscuous mottlings on the side, brown; body covered with broad flattened hairs; legs long, slender, spiny, reddish; claws long, outer three times as long as the tibia is broad, with two teeth, inner two-thirds the length of outer, with a hair at apex reaching beyond the apex of the outer claw; tenant hair wanting; furcula slender, long; manubrium short, two-thirds the length of the dentes; dentes with a row of long hair-like spines along each side of each member; mucrones about one-fourth the length of the dentes, serrate beneath. Length, 2–3 mm.

Habitat: Olympia, Washington. (Kincaid, collector).

BOOK NOTICES.

THE INTER-RELATION OF INSECTS AND FLOWERS.—During the last eight years there have appeared from the pen of Mr. Charles Robertson, of Carlinville, Ill., several most interesting articles on the inter-relation of insects and flowers. The titles are as follows :—

Botanical Gazette.

1886. Notes on the pollination of Asclepias.
1887. Insect relations of certain Asclepiads.
1887. Fertilization of Calopogon parviflorus.
1888. Effect of the wind on bees and flowers.
1888. Zygomorphy and its causes : I—III.
1889–93. Flowers and insects : I—XI.

Trans. Am. Ent. Soc.

1889. Synopsis of North American species of Oxybelus.
1891–93. Descriptions of new species of North American Bees.

Trans. St. Louis Acad. of Science.

1891, 1892. Flowers and insects: Asclepiadaceæ to Scrofulariaceæ.—Umbelliferæ.—Labiatæ.

Mr. Robertson began in 1886 to study the visits of insects to flowers, and by his persevering observations he has succeeded in collecting an enormous number of facts which he has published mostly in the Botanical Gazette, and in the Transactions of the St. Louis Academy of Science. He has studied the subject especially from a botanical point of view, and has given particular attention to the attractions offered to insects by the flowers of different species of plants, to the peculiarities of arrangement of their different parts, to their coloration, and to the modifications which many flowers seem to have undergone from their being constantly frequented by certain species of insects. Such studies have nevertheless an immediate bearing on entomology, as they give us at the same time an insight into the purposes of insects in visiting flowers, into their habits of feeding and collecting either nectar or pollen, or both at once, and into the intelligence they display in order to attain their end. The close attention thus necessarily given to insects has had besides the natural result of causing Mr. Robertson to discover that many of those insects which he was observing in his locality, Carlinville, Ill., had not even been described. Therefore, he found it "necessary at first to pay particular

attention to collecting and determining the insects." He was helped in this work by specialists in Diptera and Coleoptera, and had himself to work out and describe many species of Hymenoptera: 10 out of 14 species of *Oxybelus*, 28 out of 30 of *Andrena*, and at least 30 other species of Andrenidæ. The descriptions of these have appeared in the Trans. Am. Ent. Soc., 1889–1893.

The two great agencies of cross-fertilization of flowers are the wind and insects; hence Mr. Robertson has thus been led to notice some interesting facts concerning the effect of wind on bees and flowers. (Bot. Gaz., XIII., 1888, p. 33).

The first papers by Mr. Robertson are on the pollination of Asclepias, the flowers of which are most interesting in their peculiar adaptation for cross-fertilization by the agency of insects. Their structure and the great difficulty the smaller insects have in effecting pollination, lead Mr. Robertson to believe that "bumble-bees have had most influence in modifying the flowers, and they are the most common visitors after the hive bees. Hive bees, it is to be remembered, do not belong to our fauna."

Our space is too limited to allow us to follow the writer into what he has observed in all the different orders and species of flowering plants studied; but the names of all the insects observed visiting the flowers are given, as well as tabular data of the respective number of visitors of the different classes—Hymenoptera, Diptera, Lepidoptera, Coleoptera and Hemiptera.

As an instance, it may be mentioned that on the flowers of *Ceanothus Americanus* there were seen 48 species of Hymenoptera, 45 of Diptera, 2 of Lepidoptera, 13 of Coleoptera, and 4 of Hemiptera; and considerations are given, as in the case of all other blossoms treated of, on the arrangement of the flowers, their form, colour and other peculiarities of structure, some of them exceedingly minute, in which close and patient observation often succeeds in discovering most wonderful purpose and design for insuring cross-fertilization. These investigations are of great interest, and we commend them to the attention of Entomologists and Botanists as a fertile field of useful special study. Our idea in mentioning these excellent articles of Mr. Robertson's is to draw to this subject the attention it deserves from Entomologists, who from their place of publication might not be aware of their existence.

J. A. Guignard and J. Fletcher.

BUTTERFLIES FROM CHINA, JAPAN AND COREA. By John Henry Leech, B. A., F. L. S., &c. In parts, 4to, 642 pp., 43 Plates; R. H. Porter, London, Dec., 1892—Jan., 1894.

The fifth and last part of the letter-press of Mr. Leech's work has just been issued, and is accompanied by the statement that five plates of Hesperiidæ and a supplemental plate will shortly follow, completing the work. Presumably, these plates will be accompanied by the letter-press of the title page, preface, and index, with which the work will be ready for the binder. As to the typography of the book, it must be said that it leaves nothing to be desired. The paper is luxuriously heavy; the type is beautifully clear and large; and the text conspicuously free from errors of a minor character, such as occasionally appear even in the most carefully edited works. The scholarship and taste of Mr. Leech and his accomplished secretary, Mr. Richard South, are reflected in the execution of the literary portions of the work. The plates, which are from drawings by William Purkiss, and are executed by chromo-lithography by William Greve, of Berlin, are without doubt the finest examples of this form of work which have as yet graced any similar publication. While a preference is by many accorded to figures lithographed and afterwards coloured by hand, and the most exquisitely perfect illustrations have been produced in this way, and while the results of chromo-lithography as ordinarily employed in scientific illustration have generally been more or less marred by striking crudities, these plates before us are most marvellous illustrations of the capabilities of the chromo-lithographic process, when employed by those who are masters of the art. The plates are almost perfect facsimiles in form and colour of Mr. Purkiss's exquisite drawings, and the student of Chinese and Japanese lepidoptera may well rejoice upon having at his command such an infallible guide to specific identity as is found in these beautiful illustrations. The only adverse criticism which the mechanical and typographical execution of the work admits is on the score of the bulk of the letter-press which will necessarily be bound up in one volume. The heavy paper employed results in the production of a book which as a manual of reference promises to be somewhat uncomfortably "fat."

The title of the book indicates the consciousness of the author that in our present state of knowledge any effort to deal with the lepidopterous fauna of the great regions covered by this work must at best be attended by imperfections. There are wide areas in China in which little

or no attempt has yet been made to make collections, and it must necessarily be many years before it can be asserted that our knowledge of the faunistic resources of Central Asia is complete. In his classification, Mr. Leech follows the order now almost universally recognized by writers in England and on the continent as most natural. He erects, so far as the writer has been able to observe, no new genera, and while giving us a large number of new species, appears to have pursued a conservative course in this regard, which is to be commended. To the student of Asiatic lepidoptera, the work is simply indispensable, and will remain a lasting monument of the energy and scientific accomplishments of its learned and enthusiastic author. W. J. HOLLAND.

SCIENCE GOSSIP. New Series: Vol. I., No. 1, March, 1894. London: Simpkin Marshall, Hamilton, Kent & Co.

After the lapse of a few months the old established and deservedly popular magazine, "Hardwicke's Science Gossip," re-appears under the above title, with a change of editor and publisher, but, we are glad to find, with no serious change of plan or scope or style. The new editor, Mr. John I. Carrington, was for thirteen years editor of the London *Entomologist*, and also connected for a long time with the *Field* newspaper as a contributor to its Natural History Department; he has associated with him a long list of able assistants, and we may feel every confidence that the new series of the magazine will be as useful and entertaining as any of the preceding volumes. The first number now before us contains many interesting papers, including two on entomological subjects: British Dragon-flies and Roosting Butterflies, the latter with two pretty illustrations. We can heartily commend this publication, and trust that many of our readers will subscribe to it and receive a monthly store of delight.

MYRIAPODES DES ENVIRONS DE GENÈVE PAR ALOIS HUMBERT. Genève et Bale: Georg & Cie, 1893.

We have to thank M. Henri de Saussure, the editor and publisher of this posthumous work, for this handsome addition to the library of our Society. It is a quarto volume, well printed and illustrated with a portrait of the late M. Humbert, and fourteen beautifully executed plates of Myriapods and their structural details. To any one interested in the study of these rather neglected creatures, this work must be perfectly invaluable.

EIGHTH REPORT OF THE INJURIOUS AND OTHER INSECTS OF THE STATE OF NEW YORK FOR THE YEAR 1891. By J. A. Lintner, Ph. D., State Entomologist, Albany, 1893.

Anything published by Dr. Lintner is sure to contain much valuable information and to be highly interesting, whether the subjects treated of are new to us or not. The report before us fully supports this statement. It treats of a large number of insects, injurious or otherwise, and gives in most cases a life history of each, including the author's own observations, which are always accurate and clearly detailed. Attention may especially be drawn to the accounts of the Raspberry Geometer (*Synchlora glaucaria*), the Birch-leaf Bucculatrix (*B. Canadensisella*), and the Pear-midge (*Diplosis pyrivora*). An appendix contains some very interesting popular lectures on Economic Entomology, which are well worth perusal. The only drawback to the report is the late date of its publication, which is more than two years after the observations recorded in it were made.

REPORT OF THE ENTOMOLOGIST AND BOTANIST (James Fletcher, F. R. S. C., F. L. S.), Central Experimental Farm, Ottawa, 1894.

Mr. Fletcher's reports are always interesting and valuable, and the present record of the chief insect attacks of last year and his observations upon them, is not less so than its predecessors. The season of 1893, as far as destructive insects were concerned, was only remarkable for the superabundance of locusts (grasshoppers) and the consequent damage inflicted upon oats and many other field and garden crops. Other attacks were for the most part of the familiar kinds which we have always with us; these are briefly mentioned in the report, while more attention is paid to the serious injury caused to grain crops in Manitoba and the Northwest by cut-worms, the ravages of locusts, granary insects at the Chicago Exhibition, the Horn-fly, etc. Very interesting accounts are also given of *Silpha bituberosa*, which attacks vegetables in the Northwest Territories, and *Polyphylla decemlineata*, which was very injurious to shrubs of various kinds in a nursery at Victoria, B. C.

In the botanical section of the report there are two papers especially noteworthy, those, namely, on grass for the protection of shores and harbours, and on the "Tumble-weeds" of the Northwest. The pamphlet is illustrated by a handsome full page picture of Mr. Fletcher's grass plots at the Experimental Farm, which are full of interest to every visitor, and thirty wood-cuts. It is gratifying to observe how steadily the author's reputation is growing, and how highly his work has come to be appreciated from one end of the Dominion to the other.

CORRESPONDENCE.

GENERA OF THYSANURA.

Sir,—The recent changes in the generic names of Thysanura (Vol. xxv., p. 313 et seq., vol. xxvi., p. 54) suggest a few comments.

Lipura and *Anoura* are changed because preoccupied in Mammalogy. I do not find these names in Flower and Lydekker's recent work, and it may be that they do not represent valid genera of Mammals. But on p. 314, Mr. Macgillivray states that both *Anurophorus* and *Adicranus* have for their type *Podura fimetaria*, which belongs to *Lipura*, Burm. Why, therefore, is the new name *Aphorura* proposed for *Lipura*, when two names, neither apparently preoccupied, already exist?

Anoura, it appears, had also been used for a genus of Echinoderms previous to the publication of the Thysanuran genus.

Triæna had been used three times before the genus of Thysanura was named, so it will doubtless have to be changed, as Mr. Grote indicates. But can the name *Macgillivraya* be used? I find in Scudder's Nom. Zool. a genus *Macgillivraya*, Forbes, 1851, belonging to the Mollusca.

What is the date of *Lubbockia*, Haller? Apparently 1880. But I find in Scudder's work a genus *Lubbockia*, Claus, of Crustacea, dating from 1862. T. D. A. COCKERELL, New Mexico Agric. Exp. Station.

ERRATA.—Can. Ent., p. 32, line 4, for PROSOPOPHARA read PROSOPOPHORA. Can. Ent., p. 36, line 6, for "the ridiculous" read "be ridiculous." Can. Ent., p. 38, line 22, for Coleopterous read Coleophora.

CALOTARSA ORNATIPES.

Sir,—Professor Townsend has been misled by certain resemblances in referring his new genus *Carlotarsa* (CAN. ENTOM., XXVI., p. 50), to the Syrphidæ, where it certainly would be an anomalous form. It belongs among the Platypezidæ, and is apparently synonymous with *Platypeza*, though it may be new. The family receives its name from the peculiar structure of the tarsi, There have been three genera with terminal arista described from North America belonging among the Syrphidæ—*Ceria*, *Pelecocera*, and *Callicera*. (See Snow, Kans. University Quarterly, Vol. I., Part I., 1892). S. W. WILLISTON, Lawrence, Kansas, Febr. 9, '94.

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The Canadian Entomologist.

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BUTTERFLIES COMMON TO NORWAY AND ARCTIC NORTH AMERICA.*

BY F. M. WEBSTER, WOOSTER, OHIO.

In his "Fortegnelse over Norges Lepidoptera" (Christiania Videnskabs-Selskabs Forhandlinger for 1893, No. 13), Dr. W. H. Schoyen, State Entomologist of Norway, has given us a list of 1267 species of Lepidoptera that inhabit his country, tabulated to show the Provinces in which they occur, and the exact latitude over which each species is known to be distributed. The interest which this list posesses for the American entomologist is in the number of species it contains that are common to both countries. As studies of this nature are of much interest to the student of geographical distribution, but unfortunately out of the reach of many, I here give a list of such species as occur with us, their distribution being given both in America, as far as I am able to do so, and in Norway according to the information contained in Dr. Schoyen's list.

It will aid us considerably in understanding the subject, to keep in mind an idea of the topography of Norway, stretching as it does from lat. 58° to 71°, and throughout this distance consisting of a narrow stretch of country lying between a mountain range and the Arctic Ocean. Northward from about 62° 30′ the provinces extend from the sea inland to the mountains, but south of this a range of mountains extends through near the centre with provinces lying both to the east and to the west.

Papilio machaon, Linn. This is the only species of the genus included in the list, and occurs in all but six of the eighteen provinces of Norway, ranging from the extreme south at lat. 58° to 70° 18′, the unoccupied area, however, being the central and the very extreme northern parts of the country. In North America, var. *Aliaska*, Scudder, is quite common in Alaska, from whence it extends eastward to Hudson Bay at about 51° 30′, though I find no proof of its holding this latitude to the

*Read before the Ohio Academy of Science, Dec. 28, 1893.

Pacific Coast. *P. machaon* has been reported as far south as the north-western United States, probably about lat. 48° or 49°, by Dr. Hagen and Prof. Henshaw.

Pieris rapæ, Linn. This is found in ten provinces, thus covering a less area than the preceding, and ranging from 58° to 69° 30′, or from the extreme southern to within one and one-half degrees of the northern extremity. In America it extends from the Atlantic Coast to the Rocky Mountains, and from about lat. 30° to 48° and possibly beyond.

Pieris napi, Linn., (cum *v. nepææ*, Esp., and *bryoniæ*, Ochs.) This has a still wider range in Norway, occurring its entire length from 58°. to 71°. and in all but one of the provinces, this being Stavanger, at the south-west and coastal. With us, *bryoniæ* is found from Alaska eastward to Newfoundland. In his recent work, "Brief Guide to the Commoner Butterflies of the Northern United States and Canada," Mr. S. H. Scudder has considered this species under the specific name *oleracea*, Bois., of which he says: This northern species occurs throughout all but the southern parts of our region, though in scanty numbers except in mountainous districts; it appears, however, to be absent from the prairies west of the Mississippi river, and wherever it has come in contact with *P. rapæ*, it has become relatively rare. Prof. French calls my attention to *napi* being given in Mr. Edwards's list of 1884, from Michigan, and Prof. Blatchley has since recorded it from northern Indiana, about lat. 41°, which is probably about its southermost limit, east of the Rocky Mountains.

Colias palæno, Linn., (*v. Lapponica*, Stg.) This is almost as widely diffused in Norway as is the preceding, occurring in all but four of the provinces and ranging from 58° to 70° 25′. It is rather a curious fact that provinces where it is not recorded as occurring, Stavanger, South Bergenhus, North Bergenhus and Romsdal, all lie in the south-western part of the country, along the coast, while inland it is found in precisely the same latitude. With us *C. palæno* is found in Labrador.

Colias hecla, Lef. The Norway distribution of this species is limited to three provinces, Nordland, Tromso and Finmarken, the range being from 66° 50′ to 70°, these provinces being the three northernmost. In North America the species is distributed from Alaska to Greenland, its southern boundaries being as yet undefined. In case *C. Meadii* and *C. elis* should either one prove to be varieties of *C. hecla*, then Mr. Thomas

E. Bean's record of its occurrence at Laggan, Alberta, 51° 25′, will be the southern limit on the Pacific coast for the latter, while the former extends to Colorado, at least so far as we now know.

Vanessa antiopa, Linn. This is recorded as occurring 58° to 70°, and in all but two of the provinces, Stavanger and North Bergenhus, on the south-western coast and included in the area over which *Colias hecla* is reported not to inhabit. However, as the two provinces are separated by South Bergenhus, in which the species is recorded as being present, we are led to suspect that it may yet be found in one or both of these now unoccupied provinces. With us the species occurs throughout North America.

V. atalanta, Linn. Dr. Schoyen records this from eleven provinces, and ranging from 58° 38′ to 63° 26′. With us this is as widely distributed as the preceding.

V. cardui, Linn. This, in Norway, occurs in two-thirds of the provinces, and ranges from 58° to 69° 40′. In America it is as generally distributed as the preceding. In Norway the area where it is not recorded comprises the south-west coast provinces.

Argynnis chariclea, Schn. This appears to occur in only a single and at the same time the most northern province, ranging only from 69° 20′ to 70° 42′. In America, it ranges from Labrador, Hudson Bay and Gulf of St. Lawrence on the east, to probably about lat. 51° 25′ on the Pacific Coast, no where, according to Mr. Edwards, extending into the United States.

A. polaris, Boisd. This has in Norway a very little wider range than the preceding, occurring in only two provinces, Tromso and Finmarken, and covering area between 69° and 70° 25′. In regard to the distribution of this species in North America, the only records to which I have access give the habitat as Arctic America, Greenland and Labrador.

A. freija, Thbg. The Norwegian range of this species is much wider than that of the preceding, occurring, as it does, in eight of the eighteen provinces, and over an area extending from 59° 35′ to 70° 25′, being absent in the extreme southern and also the extreme northern portions. Of these ten provinces where it is not recorded as occurring, one is located in the central (coastal), three south-eastern (inland), two southern (one coastal and the other adjoining inland), two south-western (coastal), and two western (coastal), and presumably the extreme north coastal part of Finmarken, the northernmost territory of the country. In

America this species is considered as synonymous with *A. freya*, Thunb. With us it occurs from Alaska to Labrador and westward to the Rocky Mountains, which range it follows southward to Colorado, about lat. 39°. It is probable that in southern Norway it is also confined to the mountain regions.

A. frigga, Thbg. Dr. Schoyen's list restricts this to four provinces—Akershus, Buskerud, Tromso and Finmarken. The first two are northern coastal, the last two southern inland. The range is from 59° 56′ to 70° 40′. With us it is recorded as inhabiting Arctic America and Labrador, and from Alaska south along the Rocky Mountains to Colorado.

Erebia disa, Thbg. This is recorded as inhabiting but two provinces, Finmarken and Nordland, the former the northernmost and the latter in the central portion of the country, the two being separated by the province of Tromso. The range is limited to from 66° 50′ to 70°. In America, we have the variety *mancinus*, Db-Hew, which appears to be quite common in northern Alaska, whence it extends to the Rocky Mountains in British America, with the southern limit not yet defined.

The idea of giving the latitude of the occurrence of species is, it appears to me, much better than giving the name of some out-of-the-way place that is not included on even a small portion of our own maps, to say nothing of those to which entomologists of other countries have access. The name of the place is all well enough, but where the latitude can also be given it will render the statement as to location much more intelligible, both at home and abroad, and this too despite any variation in the matter of isothermal lines.

TRYPETA SOLIDAGINIS, FITCH, AND ITS PARASITES.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In April of last year I found on the banks of the Ottawa River, at Como, Province of Quebec, a number of very fine stems of a species of Golden-rod. These stems were bare and dry, and bleached by the winter storms. Their attraction for me lay in this—nearly every one of them was burdened with a fine large Trypeta-gall. On some of them two such galls were to be seen. I measured one of the excrescences, and found it to be three inches and five-eighths of an inch in circumference. The galls of the same kind that I have found at Quebec have not been nearly

so large nor so abundant. I took a number of the Como galls home with me, and in due time obtained a good supply of perfect specimens of *T. solidaginis* from them.

The species is very fully described by Loew in his "Monograph of the Diptera of North America," Part I., p. 82 (Smithsonian Miscellaneous Collections, April, 1862). To those who have not access to this work, the following brief description of the insect may be acceptable :—

Size.—Expanse of wings, eleven-twentieths of an inch. Length of body, six-twentieths. Width of thorax, two-twentieths.

Head.—Face, whitish. Eyes, bronze-yellow. Antennæ, yellow, short. Mouth-opening wide.

Thorax broad and convex, set with short yellowish hairs, has dark-brown longitudinal stripes. Scutellum, convex and blunt. Wings, large, umber-brown at the base, and then having an umber-brown, zig-zag, scroll-like band ; the hyaline interstices being finely reticulated, more or less, with brown. The legs are flavescent—the femora being somewhat darker.

Abdomen broad at the base, and then gradually tapering to the extremity—the segments being marked with short, whitish hairs. The borer of the female is very distinct. It is flat, of a reddish-brown colour, and tipped with black.

The gall produced by this insect is a pithy gall—it is filled up with the cellular tissue of the plant. Why the wounds caused by some insects should produce galls of this nature, and those caused by others should produce hollow galls, is one of the mysteries of Nature that science has not yet cleared up.

In the Trypeta gall, the short, plump, yellow larva lies snugly ensconsed, closely surrounded by the vegetable tissues. It gradually tunnels a way of exit for the fly ; and then, as the spring draws near, undergoes the pupal change. The pupa is about five-twentieths of an inch long, oval, ochreous, but darkening to brown at the head. This brown portion is ruptured when the fly makes its escape.

I have raised from the galls two kinds of parasites, viz :—*Eurytoma gigantea*, Walsh, and the males (called by Walsh, *Pimpla cœlebs*) of *Pimpla inquisitor*, Say.

Eurytoma gigantea is a very remarkable insect. It is described by Walsh in the 2nd Vol. of the "American Entomologist and Botanist," p. 300, from two females "captured at large."

The specimens I have vary greatly in size. The largest of them measure five-twentieths of an inch in length, with an expanse of wings of seven-twentieths.

Head, black, deeply and closely indented (like a thimble) and set with short white bristles. Eyes, round, prominent and set high up in the head. Ocelli very small. Antennæ 9-jointed (8 in the flagellum). Walsh gives the proportions of the joints very accurately as 14, 3, 6, 5, 5, 4, 4, 4, 6. Palpi black.

Thorax, black, more coarsely punctured than the head. Wings hyaline, veins honey-yellow. Legs, black—the hindmost and middle pairs have the knees and extremities of the tarsi yellowish-white ; the first pair have the tibiæ and tarsi honey-yellow.

Abdomen, in the female, large, compressed laterally, and ending in a long spur turned upward ; black, smooth and polished.

The male, which was unknown to Walsh, differs from the female in these respects :—It is smaller ; the joints of the antennæ, with the exception of the scape and the terminal joint, are more nearly equal ; the tibiæ of the first pair of legs are considerably infuscated ; and the abdomen is rounded, and diminishes regularly. Around the extremity of the abdomen are some white bristles. The head and thorax are coarsely punctate as in the females, and the abdomen is polished and glabrous.

It was too late when I obtained the galls to find the larvæ of *E. gigantea ;* but I discovered several pupæ. They occupied the cells of the Trypeta larvæ, and were at first of a pure white waxen appearance. The form of the fly was clearly outlined in them. They gradually darkened till the flies were ready to appear.

Concerning this species, Mr. G. C. Davis, of the Michigan Agricultural College, writes to me, " I am quite sure the chalcid is *Eurytoma gigantea*, although it varies slightly in colour markings.

Pimpla inquisitor, Say. The male of *P. inquisitor (P. cœlebs*, Walsh, Trans. St. Louis Acad., III., 141) is a very elegant insect, slim and graceful. Its length is three-tenths of an inch ; expanse of wings, five-tenths ; length of antennæ, two-tenths. *It has a white face*, in which it differs from the female ; and the palpi are white. The first joint of the antennæ is black and much larger than the other joints, which are dark-brown. The other parts of the head are black, rough and thickly set with short whitish bristles, as are also the thorax and abdomen.

The first and second pairs of legs are orange-red, with whitish tarsi. The third pair have the femur orange, with black at the extremity. In this pair the tibia and tarsus are beautifully banded with black and white.

I obtained 10 males from about 50 Trypeta galls, but not one female—the females, however, are not scarce in these parts. At least half the galls were parasitised by the foes above described.

SOME NOTES ON THE COLLECTING SEASON OF 1893.

BY J. ALSTON MOFFAT, LONDON.

After the long, steady and severe winter we had in this locality, every one hoped for an early spring; but in that we were disappointed, things generally being no further advanced at the end of May than they usually are in the middle. June came in warm, but with such continuous rains as to prevent collecting to any extent. Towards the end of the month the weather became more favourable and insect life appeared in profusion; belated species mingling with some that seemed to have emerged before their time. During the first three weeks of July one might have collected all day and night with profit, and as that was impossible, one could see that opportunities were being lost which only occur now and again after long intervals. August was hot and very dry, which seriously affected vegetation and had a correspondingly injurious influence on autumn collecting.

Of the Diurnals, the most notable to me were, *Limenitis ursula*, quite plentiful but difficult to secure; *Pieris oleracea*, abundant in one locality; *Papilio cresphontes* was reported in July, and during August it was frequently seen. On the 8th, I took a trip to Windsor and Detroit. On the way I saw many fine fresh specimens feeding on flowers by the wayside. At Windsor and Sandwich, several were observed, but at Belle Isle they were numerous. I saw six of them feeding on one flower-bed at the same time. It was about the only large butterfly on the wing there at that time. Toward the end of the month battered specimens were seen on the streets of London. On the 26th, I captured three broken specimens that had been flitting about a prickly-ash bush in Mount Pleasant Cemetery. On the 17th of October, I found a number of larvæ on that same bush, and took three of them. On the 21st, the largest of them pupated, the others perished for want of food. I visited that bush on the 20th, the larvæ remaining had about doubled their size, but had a greasy look; there had been some hard frosty nights. On the 13th of February, 1894, that pupa gave forth the imago, a female, extremely small, measuring three inches in expanse of wing, and one and three-fourths from the front of the head to the end of the tail on hing wing. A number of reports have been published of the appearance of *cresphontes* last summer in new localities, or in increased numbers in old ones, indicating that it is spreading north and west and becoming more firmly

established where it has obtained a foothold ; but it may be periodical in its habits, and 1893 may have been with it also an exceptional year.

In the Heterocera, I secured several good things which I had never taken before. *Acronycta grisea*, a single specimen, and there was but one example of it in the Society's collection. *Xylomiges confusa*, a single specimen ; of this also there was but one in the collection, and that in very poor condition.

On the 31st of August, whilst strolling in a bit of woods to the east of the city, I saw a conspicuously bright gray moth resting on the trunk of a tree. Upon close inspection it proved to be new to me. When I removed it from the spreading-board I compared it with what I thought it most resembled, but the nearest approach that I could find to it was *Platycerura furcilla*. Shortly after I had occasion to examine the D'Urban collection, and whilst doing so my attention was arrested by a specimen labelled *Audela acronyctoides*, which recalled to mind my new moth, and upon comparing them they were found to be identical, except in freshness. Mr. Grote in his notes on the D'Urban collection (CAN. ENT., Vol. IX., p. 27), remarks : "The specimen is in poor condition, but its ornamentation being marked, the species is quite recognizable." That is a correct description of it as it is to-day, and my find is a fresh and perfect duplicate of the type, and a really handsome insect. Prof. Smith says in reply to my enquiry : "*Audela acronyctoides* is by no means a common insect ; on the contrary, it is decidedly rare, and there are only a few specimens known in collections. It has been taken in a number of localities, always single specimens only, and generally very early in the season."

Some of the late Geometers were quite abundant. From the 19th to the end of August I secured about twenty *Semiothisa caesaria*, Hulst. I found them resting on the trunks of tamarac trees, whilst later on *Petrophora truncata* was quite plentiful. In the early part of October I took over three dozen *Epirrita dilutata*, Bork. On the 9th I secured twenty-seven of them on the same trees from which I took the *Caesaria*. The day was cool, and they sat close ; being very conspicuous objects, I secured in about an hour's time all I saw of them, except one ; it was sitting on the sunny side of a tree and arose as I approached it, when a Phœbe bird gave chase and had it before it could reach another resting place.

Endropia duaria and *Ellopia fervidaria*, although appearing every season to some extent, were also unusually plentiful, and some dark coloured and heavily marked forms of them were obtained.

Although the season was not uniformly good throughout, yet it proved in the end to be one of the best I have had in many years.

The following names are new to the Canadian list :—

Sarrothripa Lintneriana, Speyer. Determined by Prof. Fernald, was sent to him by me in mistake as a micro.

Œdemasia nitida, Pack.

Dasylophia interna, Pack.

Panthea propinquilinea, Grote, or sp. nov. This specimen I took in 1892. I thought at the time that it was an indistinctly marked *P. furcilla*, but upon further investigation I concluded that it required authoritative determination, so I sent it to Prof. Smith, who returned the specimen with the following remarks about it :—" No. 37 is exceedingly interesting and is somewhat different from anything that I have ever seen before. It comes nearest to *Demas propinquilinea;* but I never saw before one quite so well marked as this is. All the specimens from this region are a good deal more powdery and darker with very little contrast in maculation. I would not be at all surprised if a good series of both species would prove the Canadian form distinct."

Hadena vulgaris, G. & R.

Oncocnemis viriditincta, Smith. This is a species that I took a few specimens of at Hamilton, many years ago. It was given a name provisionally and placed with the named material. I had known for long that it was out of place, but forgot it when sending for names. So to avoid that again, I placed a specimen with the unnamed material, and it went to Prof. Smith, with others, in December last. When the Professor sent me the names of the others, he pronounced this one to be an " oddity," saying " It reminds me of some West Indian species," and suspected that it must have been a transient visitor. But upon assuring him that I had taken four of them, that I had seen more of them than I captured, and that they were not all taken in the same year, and on sending to him a male specimen for further examination, he wrote to me thus :

"I find on a study of the specimen this time received, that it is an *Oncocnemis*, and further it looks remarkably like a species which I received from Mr. Bean, from McLean, British Columbia, and which I called *viriditincta* from the beautiful greenish tinge of the scales covering the surface. Looking at this specimen to-day I find that this greenish or mossy appearance is rapidly disappearing, and that in an old specimen I can understand that there will be little or none of it to be seen." Whilst farther on he remarks: "It is certainly somewhat interesting and peculiar that you should have found at Hamilton the same species under what it seems to me must be widely different conditions. The matter is of further interest because this makes the second species of this genus which has been found in what may be called the Eastern States, all the others coming from the western plateaus or from the mountains." As a coincidence, I may state that the three or four specimens of *Oncocnemis Saundersiana* which I have taken were secured in the same locality, and also feeding on the Golden-rod.

Hydrœcia inquæsita, G. & R.

Semiothisa caesaria, Hulst.

Pyrausta futilalis, Led.

Cacœcia semiferana, Walk.

Lophoderus mariana, Fern.

Tortrix pallorana, Rab.

Cenopis diluticostana, Wlsm.

Exartema versicolorana, Clem.

Penthina impudens, Wlsm.

Sericoris albiciliana, Fern.

Semasia radiatana, Wlsm.

Phoxopteris apicana, Walk.

" *Goodelliana*, Fern.

Cryptolechia obsoletella, Zell.

NOTES ON SOME SCALE INSECTS OF THE SUB-FAMILY DIASPINÆ.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEX.

The following notes are intended to throw further light on the affinities of certain little-known species, which I have lately examined :—

(1.) *Chionaspis major*, Ckll.—Found on Heliotrope at Antigua by Mr. C. A. Barber. The ♀ resembles that of *Diaspis lanatus*, but may be distinguished from it without difficulty. There is only one pair of lobes, and these are very large, elongated, and crenate on both sides; they touch one another at their bases, but diverge toward their tapering extremities. There is a small spine near the outer edge of each lobe. On the margin beyond the lobes are three spine-like plates, then a shallow notch, then three more plates, then another shallow notch, then a series of from five to eight spine-like plates, mostly large, one especially so. The produced margins of the segments cephalad of this bear spine-like plates, the first counting from the caudal end having nine, the second 5, the third 8, the fourth 4 or more, the fifth 4 or more small ones, and the sixth only rudiments.

This insect is not allied to the common West Indian *Chionaspis, C. minor*, Maskell, but belongs to the group of *C. salicis*, L., etc. The scale is about 4 mm. long, oval, white with brownish exuviæ.

(2.) *Diaspis cacti*, Comst. n. syn. *opuntiæ (opunticola)*, Newst., Ent. Mo. Mag., 1893, pp. 188, 280.

Mr. Wickham has sent me some specimens found in a greenhouse at Iowa City, Iowa (coll. M. F. Linder), which lead me to advance the above synonymy. They present all the characters of *cacti*, and in addition the numerous "spinnerets or pores," and the elongated pores, which form the specific characters of *opunticola*. I cannot believe that there is a distinct species, *D. cacti*, resembling the present one in all other respects, but lacking these pores, and must assume that Comstock's description was so far imperfect. My variety *opuntiæ* (Journ. Inst. Jamaica, Vol. I., p. 256), from Jamaica, looks different owing to the much paler exuviæ (paler, no doubt, because less exposed), but I can see nothing to distinguish it as a species from *cacti*. It has the pores of *opunticola*.

Mr. Newstead's scales differed also a little in colour from typical *cacti*, so that three colour-mutations may be distinguished thus :

(1.) Exuviæ not strongly contrasting with scale, . . *opuntiæ*, Ckll.

(2.) Exuviæ strongly contrasting.

(a.) Scale grayish-white or greenish, ... = *cacti*, Comst.

(b.) Scale pale yellowish-brown, ... = *opunticola*, Newst.

The mut. *opunticola* is from Demerara.

I quite expect that *D. cacti* will itself prove to be a synonym of *D. calyptroides*, Costa. The colour character given by Comstock will not hold, as I found *D. cacti* v. *opuntiæ* had the ♀ sometimes (in February) orange, sometimes pale yellow. The other characters, of the grouped glands, are surely also variable.

(3.) *Aspidiotus fimbriatus*, (Maskell). Syn. *Diaspis* (?) *fimbriata*, Maskell, Trans. N. Z. Inst., 1892 [publ. 1893], p. 208. Found on *Eugenia* in Australia by Mr. Koebele.

Mr. Maskell has kindly sent me specimens, and I am convinced that the species belongs to *Aspidiotus*, and in that genus to the group of *A. nerii, destructor*, &c. This reference is borne out by the scale, and also by the terminal portion of the female, which is quite unlike that of any *Diaspis* known to me. The somewhat elongate form of the female is not of any generic significance, or at all events, cannot be considered to outweigh the structural characters of the terminal portion, which are entirely those of an *Aspidiotus*. Unfortunately the male scale is unknown.

(4.) *Aspidiotus dictyospermi*, Morgan. There is an *Aspidiotus* which I found on *Cycas* at King's House, Jamaica, and Mr. Campbell found abundantly on stems of rose at Castleton Gardens in the same island, that is apparently identical with Morgan's *dictyospermi*. The scales look like those of *A. aurantii*, but the shape of the female is as in the majority of the genus, which will distinguish it at once from either *aurantii* or *articulatus*.

The colour of the ♀ is pale yellow.

The terminal portion of the ♀ agrees well with *dictyospermi*. There are three pairs of lobes, the middle pair much largest, and notched without, the second also notched, the third very small. Between the lobes are scaly plates. Cephalad of the third lobe, the margin presents a pair of elongated plates, though not so long as in Morgan's figure of *dictyospermi*. Beyond these are two small plates. There are conspicuous elongated sacs near the bases of the lobes, somewhat after the manner of *A. mimosæ* and *A. smilacis*. The anterior lateral groups of glands are of about three each, the posterior lateral of two.

The scale is red-brown, with covered exuviæ to one side of the centre,

first skin nipple-like, shining. In regard to the scale, our insect does not very well agree with Morgan's account of *dictyospermi*, but there may be variation in this respect; in fact, Mr. Newstead has already indicated that there is, by describing the peculiar variety *arecæ*. It may be convenient also to distinguish the present form by a name, *jamaicensis*; so the varieties of *A. dictyospermi* can be tabulated thus :—

(1.) Scale elongate-oval, greyish-white, . . = *dictyospermi*, Morg.
(2.) Scale circular or nearly so, reddish or orange-brown.
  (a.) Nipple-like prominence surrounded by a depression, beyond which is a strong circular ridge, . = *arecæ*, Newst.
  (b.) Without any conspicuous depression or ridge, ... = *jamaicensis*, Ckll.

On examining the form *jamaicensis*, one can see the characters which, if much more developed, would give rise to *arecæ*; and there can be no doubt that if it should become necessary to make two species out of the above forms, they will be *dictyospermi* and *arecæ*, with *jamaicensis* as a variety of the latter.

A. mangiferæ, Ckll., from Jamaica, has a pale scale, more like that of typical *dictyospermi*; its affinity with *dictyospermi* is evident, and I should not be surprised if it ultimately becomes necessary to sink it under that species as a variety. Mr. Maskell, however, to whom I sent specimens of *mangiferæ*, wrote that the species appeared to him to be a valid one.

There is another scale insect, which in the female presents an extraordinary resemblance to *A. dictyospermi*, and that is *Diaspis pinnulifera*, Maskell, found in Fiji and Demerara. But the form of the male scale, as described by Maskell, will at once separate this from any *Aspidiotus*.

(5.) *Aspidiotus punicæ*, Ckll.—Jn. Inst. Jamaica, 1893, p. 255. The typical form of this species has the scale slightly raised, snow-white, with orange-brown exuviæ. The ♀ is almost circular, plump, orange with the hind end slightly brownish. In the orange, plump ♀, it resembles specimens of *A. rapax* found on guava. The median lobes are large and elongate, close together, and notched without; the second pair is small, the third practically obsolete. In the region of the lobes, but not beyond, are some scale like plates; and beyond the rudiment of the third lobe is a conspicuous spine. The margin, beyond, shows one or two spines. There are four groups of ventral glands.

In the specimens on cocoanut from Dominica (the type being from

Jamaica) the second pair of lobes was also practically obsolete. The ♂, from Dominica, has well-developed wings; it is dull yellow, with blue-black eyes.

So far, the species is distinct and easily recognized; but there are some allied forms, concerning which it is not easy to come to a sound judgment; I will discuss these under the head of *A. diffinis*.

(6.) *Aspidiotus affinis* (*diffinis*), Newstead. Ent. Mo. Mag., 1893, pp. 186, 280. This is evidently very near to *punicæ*, but it differs in its high, convex, greyish-brown scale, and in the absence of plates and grouped glands. The presence of grouped glands has been shown by Mr. Newstead to be an uncertain character in *A. zonatus*, Frauenf., and I have found it equally so in *A. destructor*, Sign., but the other distinctive features seem of importance.

There is a scale found in Jamaica, which I had named in MS. *Aspidiotus punicæ* var. *lateralis*, but which I now believe must be referred to *diffinis*. The following description will serve for its recognition :—

♀ Scale 1 mm. diam. or a little over, convex, rounded, circular, or nearly so, varying to oval, dull brownish-white, varying to brown, with covered brown exuviæ, resembling those of *punicæ*, but placed away from the centre. Scale leaving a white mark when removed from the plant.

♀ Nearly circular, terminal portion yellow, the rest variegated pink and blue in a peculiar manner. The lobes and plates as in typical *punicæ*.

♂ Scale smaller, elongate with rounded ends and parallel sides; exuviæ away from the centre.

Hab. on stems of *Jasminum pubescens*, Parade Garden, Kingston, Jamaica, Sept., 1892, collected by F. N. DaCosta.

It will be seen that this var. *lateralis* resembles *diffinis* in the scale, but differs in having distinct scale-like plates.

On a tree in East street, Kingston, Jamaica (not identified, but has pinnate leaves, leaflets 13, oblique, tips obtuse, emarginate), I found numerous scales which seemed also referable to var. *lateralis*. They were massed together on the petioles and stalks, mixed with a few *Asterolecanium pustulans*. The scales agree exactly with *A. diffinis* as described by Newstead, but most of them are parasitised, so that I could not get very good examples of the female insect. Little bright red mites were running about amongst them. The female, in this form, is bright yellow to pale yellow, not pink and blue as in the *Jasminum* specimens. The lobes are as in typical *punicæ*, and there are distinct, though narrow, serrate plates. I failed to see any groups of ventral glands.

For the present, it will suffice to distinguish two forms of *A. diffinis*, thus :—

(1.) Plates wanting ; form inhabiting Demerara, = *diffinis*, Newst.

(2.) Plates present ; form inhabiting Jamaica, . = *lateralis*, Ckll.

Whether these really constitute a distinct species, or should be considered varieties of *punicæ*, must be left for future decision. The name *punicæ* was published about three months before *affinis*, which preoccupied name was later altered to *diffinis*.

(7.) *A. biformis*, Ckll. This scale seems to be common on cultivated orchids in Jamaica and Trinidad ; it should be looked for in conservatories in this country.

♀ Scale about 2 mm. diam., circular to broadly-oval, depressed, surface granulose ; exuviæ nipple-like, dark red-brown, placed on one side of the centre. Colour of scale dark brown to black.

Conspicuous white patches are left when the scales are removed.

♀ With three pairs of lobes, the first two pairs moderately large, well-developed, with parallel sides ; the third pair more or less rudimentary. Scale-like plates between the lobes. On the margin, cephalad of the lobes, is a pointed projection, having a spine on each side of it.

♂ Scales much smaller than those of the female, narrow, elongate, with the exuviæ at one end.

This species might be confounded with *A. ficus*, but the form of the male scale will distinguish it at a glance.

(8.) *A. juglans-regiæ*, Comst. Prof. C. H. T. Townsend, when Entomologist of the N. Mex. Exp. Station, found a species of *Aspidiotus* on some young plum trees at Las Cruces, N. Mex. The trees were thereupon destroyed, and the scale, which had evidently been imported, has not been seen in the neighbourhood since.

Some specimens, however, were preserved ; and on examining them I concluded that they were *A. juglans-regiæ*. Not having any of that species for comparison, I sent a few of the Las Cruces scales to Dr. Riley, asking for his opinion. He kindly replied thus :—" The specimen which you send differs from Comstock's *A. juglans-regiæ*. It has four lateral rows of pores on the anal plate, while there are but three in Comstock's species. The fourth or external row in the New Mexican species is composed of about 20 pores, whereas in Comstock's it is composed of 3 to 8 only."

In these points it resembles Colvée's *A. juglandis*, which has the

four lateral rows of pores, and the external row composed of 16 to 18 pores.

A. juglandis is said to have the scale reddish, in the Las Cruces form it is brown, in *juglans-regiæ* pale grayish-brown. I have been much inclined to suppose that *juglandis* and *juglans-regiæ* are but forms of one species, but have not the material to prove the point. If so, our Las Cruces scale must belong to the same species.

For the sake of distinguishing our form, it may be well to describe it thus :—*A. juglans-regiæ* var. nov. *pruni.*

♀ Scale varying from very pale brown to decided brown, second skin sometimes dark brown. Exuviæ apparently covered by a fine layer of secretion, mostly rubbed off in our specimens ; second skin large, broadly oval or sub-circular, not pointed ; first skin more or less exposed, orange Shape of scale circular or nearly so ; diameter, 2½ mm.

♀ Yellow, oval. Median lobes rather large, blunt and rounded, close together, notched outwardly. Second lobes smaller but of fair size, also notched outwardly. Third lobes obsolete. Pairs of spine-like plates at intervals along the margin. Caudolateral groups of glands of from 5 to 7, cephalolaterals of from 6 to 7, median group represented by a single orifice.

♂ Scale, colour of ♀ scale, but smaller and elongate.

Hab. on twigs of plum, Las Cruces, N. Mex., May 8. (Townsend.)

I do not know any species with which this might easily be confounded, except *A. ancylus*, Putnam, which has a smaller scale, brick-red exuviæ, and the second pair of lobes obsolete.

Feb. 21.—I have just received specimens of *Aspidiotus juglans-regiæ*, Comst. from Prof. Morgan, of Baton Rouge, La. He sends it on peach and Japan plum, with the statement that "it is new in this section and is doing considerable damage."

Feb. 25.—Yesterday I found a new variety of *Aspidiotus juglans-regiæ* at Mesilla, N. Mex. :—

Var. nov. *albus*. ♀ Scale flat, 2½ mm. diam , white, with the exuviæ orange-red, but covered by white secretion. ♀ yellow, four rows of orifices marking the obliterated segments of terminal portion ; ventral glands present, median single, cephalolaterals 9, caudolaterals 10. Marginal spines and plates inconspicuous. On bark of pear trees, not very numerous.

Should this hereafter be considerd a distinct species, the varietal name now given may stand for it ; but notwithstanding the white colour, which seems quite constant in the Messilla specimens, I have no doubt in my own mind that the insect is a variety of *juglans-regiæ*, with which it appears to agree in all really essential characters.

A REPLY TO MR. W. H. EDWARDS.

BY H. J. ELWES, COLESBORNE, CHELTENHAM, ENGLAND.

I did not suppose that anything I wrote on North American Butterflies was likely to find favour in Mr. Edwards's eyes, but in a long criticism of my paper on *Œneis*, which I have just seen in the CANADIAN ENTOMOLOGIST, there are two or three points on which he has so much misunderstood or misrepresented me that I cannot pass them by, as I shall do the greater part of his remarks, as unworthy of notice.

As to the specific distinction of *Californica*, *iduna* and *gigas*, I could find nothing in Mr. Edwards's own figures or writings to guide me in separating them, and now I only see that he relies on Messrs. Wright and Fletcher, as he has seen none of them in life himself. It is quite possible that there is as much variation in the larva as in the imago, and if there is any invariable character by which they can be known apart, I am just as ready to admit it as in the case of *ivallda*. Only I must wait for Mr. Edwards to show it, which he has not yet done, so far as I am capable of judging.

Next, with regard to *Uhleri* and *varuna;* I quite admit that one and the same species of Œneis is not likely to fly on low, grassy plains and on alpine peaks, though I have taken both *Parnassius smintheus* and *Erebia epipsodea* in quite as dissimilar situations. But where did I say that *varuna* was found on alpine peaks? Kananaskis, though 4,000 feet above sea-level, is just such a grassy level valley in the mountains as *Uhleri* frequents in Colorado, and the elevation of 4,000 feet there is, with regard to timber line, equal to about 7,000 or 8,000 feet in Colorado—just the level at which *Uhleri* seems most abundant. It is *Uhleri*, as Mr. Edwards says, and so are the specimens found at other localities farther east in Alberta. If they have a difference sufficient to distinguish them it is for Mr. Edwards to define the range of both and give us something more definite than he has done as differential characters.

Now we come to *Æno* Bvd. a name which I have ignored, because I cannot identify it certainly with any species. Mr. Edwards, having adopted the name on other people's authority, feels bound, I suppose, to support it. But it is not consistent of him after doing so to refuse to recognize the much better evidence I have given for the identification of the name *subhyalina;* simply, as it seems, because he prefers to suppose that the type is not really the specimen described by Curtis. He says that it was described sixty years ago, and "in course of sixty odd years

the chances are against the survival of any particular cabinet insect! It has a hundred enemies besides the possibility of accident. It is not an unknown thing for the owner of a collection of insects, when a type is destroyed, to attach the label to another example that seems near or pretty near the original." Here, perhaps, we have an explanation of the reason why, as I have pointed out in my reply to his criticism on my paper on Argynnis (see CAN. ENT., Vol. XXII., p. 150), I never got any help from Mr. Edwards in identifying so many of his types. But we do not so use our types in Europe, and there is not the slightest reason for assuming, as Mr. Edwards has done on the authority of an anonymous correspondent, that the type of *subhyalina* Curtis, is not the insect described by him. It happens that there was a label in what I believe to be Guénée's handwriting to the effect that this specimen was the one described by Curtis; but suppose it was not, what ground has Mr. Edwards for applying the name of a species described from Arctic America (?) to a species now only known to occur on the high peaks of the Rocky Mountains of Alberta, and never re-found by any of the numerous Arctic expeditions which have been out since Ross's time, and have covered a good deal if not all the ground covered by him.

As to my *Œ. Alberta*, Mr. Edwards had better wait till he sees it before saying that it is *varuna*. If he cannot distinguish it from *varuna* by the description, it only shows that either his or our description is bad, and how does he know that the one sent him by Mr. Fletcher was the same species?

As to the identification of Mr. Fletcher's supposed female of *Macounii* taken at Morley, Alberta, I can only say that there is no question whatever of Mr. Fletcher's veracity, only, how can you tell female *Macounii* from female *nevadensis*? I referred this very point to Mr. Scudder when he was at my house last year, and he looked at the specimens and said he could not say, but thought that it was just as likely to be one as the other.

Lastly, Mr. Edwards says, and I quite agree with him, that the value of publications such as mine depends much on whether the author is thoroughly acquainted with his subject; and such acquaintance implies considerable experience as a lepidopterist and study of the forms he undertakes to speak of, etc., etc., and also an acquaintance with the behaviour, habits of flight and localities of the species, either from personal observation or reliable reports of thoroughly good observers. That is

just what I think, too, and I have made two journeys in the west, and a great many in Europe and Asia in search of this knowledge; whilst Mr. Edwards, so far as I know, has never seen an Œneis alive anywhere or any collection of them at all comparable with those I have seen and have studied specially before writing.

As to his criticism on the value of the clasper I do not think he has any practical experience of the matter, but I will leave Mr. J. Edwards to answer him on that point :—

"I desire to say something on so much of Mr. W. H. Edwards's criticism above-mentioned, as relates to the employment of characters derived from the male genitalia and the comparative table, as these are the points with which I was more particularly concerned in the preparation of Mr. Elwes's paper on *Œneis*.

"My business was simply to examine the material upon which the paper was based, and to ascertain how many kinds there were capable of definition with reasonable accuracy; and I endeavoured to give expression to those characters which separate any given kind from all the other kinds under review at that time, and to contrast these characters in a workable form in my "Conspectus specierum." The question of the soundness or otherwise of my work I am content to leave to the judgment of any competent students who may be disposed to make an honest attempt to determine described species of Œneis by the characters there laid down. A comparative table may be very useful to many students without necessarily pleasing everybody. Mr. W. H. Edwards gives it as his opinion that characters drawn from the male genitalia are valueless, but I find in practice that they have a value equivalent to any other morphological peculiarity, and that value is, of course, in direct proportion to their constancy in a series of individuals. Perhaps the best statement of the exact value of these characters, so far as Lepidoptera are concerned, is that by Prof. John B. Smith in his Revision of Agrotis (Bull. 38, U. S. Nat. Mus., p. 7.), which I quote here as it is well worth reprinting :—

'The study of the primary sexual characters is one of the most valuable guides in the recognition of species. The structures are within my experience absolutely invariable within specific limits, and species otherwise closely allied are sometimes well separated by these characters. They have proved invaluable in settling questions of the identity of American and European forms so closely allied as to be considered races, and in several instances they have proved the identity or distinctness of

species when superficial characters left it in doubt. It has removed individual judgment as a factor in many cases and allows a final appeal in cases of difference. There is no universal test character, however, and as with all others so sexual characters sometimes fail. Over one hundred species referred to *Carneades* have so nearly the same form of structure that there is no sufficient variation to have specific value in doubtful cases. In some other groups, however, no two species are alike, and the widest variance within generic limits allows definite specific limitation.'

"As I wrote the description of *Œ. Alberta* and the paragraph immediately following, I may be allowed to point out for the information of anyone who may be disposed to accept Mr. W. H. Edwards's statement that *Alberta* and *varuna* cannot be distinguished from each other, that the former *may* be distinguished from the latter (amongst other points) by the whitish veins on the hindwing below, the absence of fulvous colouring except on the hindwing above, and the presence of a tooth or projection near the middle of the upper edge of the clasp in the male; all which particulars appear, with others, in the description in question."

JAMES EDWARDS, Colesborne, Cheltenham, England."

April 2nd, 1894.

NEW NORTH AMERICAN HOMOPTERA, No. VIII.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

1. ATHYSANUS ANTHRACINUS, *n. sp.*

Allied to *A. plutonius*, Uhl. Deep, black, highly polished, tibiæ and tarsi of the anterior and intermediate feet yellow. Length, 3½ mm.

Head shorter and more rounded before than in *plutonius*, closely punctured. Vertex ⅓ longer on the middle than next the eye, sloping and strongly rounded to the base of the front, median carina very feeble; ocelli and two dots on the hind margin fulvous. Antennæ, the basal joint excepted, pale; about six obscure arcs on the front and the rostrum, excepting its tip, fulvous. Sides of the clypeus parallel, tip feebly rounded. Knees, tibiæ and tarsi of the anterior and intermediate feet pale yellow; slender hind edge of the ventral segments fulvous. Pronotum obscurely wrinkled, more prominently rounded before than in *plutonius*. Scutellum closely punctured. Elytra almost coriaceous, deep piceous black, shagreened; nervures inconspicuous. Wings deep smoky brown, nervures blackish.

Valve of the male rather large, rounded. Plates long-triangular, exceeding the pygofers, rounded at apex and armed with a few tawny marginal bristles. Last ventral segment of the female longer than the penultimate, feebly concavely arcuated either side, the lateral angles quite strongly produced, subacute ; pygofers short and thick, blunt at apex and armed there with a few feeble bristles, a little surpassed by the oviduct.

Iowa, Kansas and Colorado. Described from one female and two male examples. The Kansan specimen was captured at Madison, by M. C. Van Duzee. That from Iowa I owe to the kindness of Prof. Herbert Osborn, and the example from Colorado is from Prof. C. P. Gillette. Prof. Osborn's specimen came labelled *Conogonus gagates*, Ashm., and in the National Museum is an example labelled *Scleroracus anthracinus*, Uhler. I have adopted Mr. Uhler's specific name as very appropriate for this deep black little Jassid, but I can find no characters to separate it generically from *Athysanus*. Its highly polished semi-coriaceous elytra are peculiar, but hardly constitute a generic character. This insect superficially resembles *Goniagnathus Palmeri*, but they are very distinct.

2. Eutettix Johnsoni, *n. sp.*

Form of *Paramesus Twiningi*. Bright orange-fulvous maculated with white. Anterior edge of the vertex acute, marked above with six black points and below with an interrupted black line. Length, 4–4½ mm.

Head nearly as wide as the pronotum. Vertex flat, depressed, ¼ longer on the middle than next the eye, anterior edge acute. Front strongly narrowed below. Clypeus a little expanded toward the rounded apex. Pronotum not twice the length of the vertex, sides rather long, obtusely carinated ; latero-posterior angles rounded. Valve of the male broad-triangular, apex truncated ; plates broad and short, little more than twice the length of the valve, rounded behind with a short obtuse tip, heavily fringed with soft white hairs ; pygofers short, truncated, with a few long white bristles. Last ventral segment of the female long, rounded, sinuated next the lateral angles, produced in a short acute tooth either side of a narrow acute median notch. Pygofers broad, tapering suddenly from the apex of the connexivum to the acute tip, which is somewhat surpassed by the stout oviduct, the sides nearly rectilinear.

Colour bright orange-fulvous, paling to almost yellow beneath and on the legs, and marked with yellow on the anterior edge of the vertex, apex

of the scutellum and more obscurely on the sides of the pronotum and tergum. Two spots on the base of the vertex, three longitudinal lines on the pronotum, the lateral broader and abbreviated before, the basal margin of the clavus, and about eighteen spots on the elytra, white; the latter coalescing in places, and forming about four transverse bands; the two transverse veinlets bounding the postnodal areole brown; nervures fulvous, rather strong. Wings faintly enfumed, highly iridescent, nervures brown. Anterior edge of the vertex with six black points, the two median approximate; base of the front with a black concentric line, crossing the temples and interrupted at the middle and below each ocellus. Claws and antennal setæ brown. Tibial spines deeper fulvous. Face with an obsolete pale median line.

The male is a little more deeply coloured than the female, and has the two inner transverse nervures beyond the apex of the clavus brown, and the wings are more deeply fuliginous.

Described from one male and two female examples taken at Philadelphia, Pa., by Mr. C. W. Johnson. This is, perhaps, the most delicately beautiful little Jassid as yet described from our fauna, and it affords me pleasure to dedicate it to Mr. Johnson, who has brought to notice many interesting forms of the *Jassidæ* from Eastern Pennsylvania and New Jersey.

This is the smallest species of *Eutettix* yet described. It has nearly the colour and markings of *Paramesus vittellinus*, and the size and form of *P. Twiningi*, and might readily be mistaken for a member of that genus, but the elytral neuration and most of its characters are those of *Eutettix*.

3. EUTETTIX CLARIVIDA, *n. sp.*

Form nearly of *Eutettix seminuda*. Pale greenish-yellow, anterior edge of the vertex with a distant pair of large black spots and two brown points at the apex. Length, 4½ to 5 mm.

Vertex hardly ¼ longer on the middle than next the eye, just ½ the length of the pronotum; marked with an impressed median line on the base, either side of which is the usual impressed area near the outer angle of the disc, and anteriorly is the transverse subapical depression common to this species of this genus. Front ¼ longer than wide, clypeus scarcely expanded apically; cheeks as in *seminuda*. Valve of the male broad-triangular, about the length of the last ventral segment; plates about twice the length of the valve, their outer edges distinctly arquated near

the base; pygofers exceeding the plates, obtuse. Ultimate ventral segment of the female rather long, hind edge rounded with a short, abrupt median projection or tooth, about twice as broad as long; pygofers broad, a little surpassed by the stout oviduct.

Colour: Entire insect pale greenish-yellow, polished, paler on the head and beneath, tips of the tarsal joints embrowned, extreme apex of the rostrum black, anterior edge of the head with a round black spot placed just above and within each ocellus, and two minute equidistant brown points between these on the apex. Mesonotum and sometimes the basal tergal segments black. Eyes brownish. Elytra subhyaline with strong yellowish nervures.

Colorado. Described from two male and four female examples received from Prof. C. P. Gillette. Except in its want of ornamentation this insect is closely related to *Eutettix seminuda*, Say, like which it approaches *Thamnotettix* in many of its characters. But its broader form, the characters of the vertex and the wide front will indicate its relationship.

4. CICADULA LEPIDA, *n. sp.*

Very near *C. diminuta*, Leth., but larger, with the front narrower and less tumid below, and with the clypeus broader at apex. Length, 3½ to 4 mm.

Colour pale yellow somewhat intensified on the abdomen and tinged with green on the vertex. Head marked with two points placed near the hind edge of the vertex about midway between the nearly obsolete median line and the eyes, two large transverse spots at apex, on the basal sutures of the front. A vertical mark either side between the ocellus and eye, about three very short frontal arcs, and a spot at base of the antennæ; all black. Eyes, frontal sutures below the antennæ, tips of the tarsal joints and a row of minute points at the base of the tibial spines, brown. Disc of the tergum, oviduct, claws and tip of the rostrum black. Elytra whitish, pellucid, faintly tinged with yellow at base and smoky at tip; nervures slender, pale yellow. Wings white. Last ventral segment short, hind edge entire, very slightly rounded; pygofers bearing a few white bristles at tip, scarcely surpassed by the oviduct.

Described from two female examples, Kansas, July, Prof. F. H. Snow. New York City, June, Mr. E. B. Southwick. Prof. Snow's specimen was taken at electric light, in Dodge Co., Kansas.

ZETHUS AZTECUS IN FLORIDA.

BY WM. HAMPTON PATTON, HARTFORD, CONN

ZETHUS AZTECUS, Saussure (Syn. *Z. Poeyi*, Sauss. and *Z. Slossonæ*, F.)

The male differs little from the female in colour (specimens from Indian River, Fla., Dr. Wittfeld); the described differences being all variations. The male clypeus is often black at base and in middle.

Saussure's description of *Z. aztecus* says, "fronte transversim in lineam elevato." Hence Fox's character of difference for *Z. Slossonæ* is incorrect, and the new name yields to *Z. aztecus*, Sauss.

Z. aztecus, having abdomen black, differs in this (and not in lacking a ridge above antennæ) from *Z. Slossonæ*, Fox.

Z. Poeyi, having abdomen red, agrees in this with *Z. Slossonæ*. The teeth of clypeus are variable.

The spiral antennal tip of *Poeyi* is not sufficiently invariable to hold this species distinct from *aztecus;* and the length of pedicle of second segment is variable in appearance. The colour (also variable) does not differ from *Slossonæ* to *Poeyi*. Hence I unite *Poeyi* to *aztecus* and add *Slossonæ* as a synonym. Occurs in Mexico, Cuba and Florida.

In *Zethus* four divisions are named in Saussure's "Synopsis":

Zethus, Sauss., second abdominal segment subsessile.

Heros, Sauss., clypeus lozenge-shaped, forming on each side an angle.

Zethusculus, Sauss., pedicle of second segment not more than one-fourth length of segment.

Didymogaster, Perty, pedicle of second segment at least one-fourth length of segment.

None of these divisions appear to be sufficiently distinct to be worthy of mention, even as sections. The length of pedicle of second segment is variable in the same species; hence, *aztecus* was placed in *Zethusculus* and *Poeyi* in *Didymogaster*.

Discælius is a synonym of *Zethus*.

NOTE ON ACRONYCTA CRISTIFERA, WALK.

BY A. R. GROTE, A.M., BREMEN, GERMANY.

Thanks to the identifications of Prof. Smith with the British Museum collection which contains Walker's types, we have now a certainty as to the correct names of almost all our species. It is clear from different remarks in the catalogue that under Mr. Butler's rearrangement of the material some shifting of the specimens described by Walker has taken place, and this shifting has equally certainly led here or there to an accidental shifting of label. I suggest as a possible solution to the *Acronycta cristifera* mystery, that the specimen B. Mus. Lists, IX., 230, 1856, marked: "*W.* Orillia, West Canada, from Mr. Bush's collection," and determined as *Mamestra brassicæ* by Walker, may now figure as the "type" of *Acronycta cristifera*, Walk., and the real type of the latter, which I saw in its original place, may have become misplaced.

In 1881, before Mr. Butler had interfered with, or Prof. Smith had seen the British Museum Collection, I examined the sole specimen and apparent "type" of *Acronycta cristifera*, Walk. It was in fair condition, with clean cut wings and somewhat narrow and tufted body parts. It belonged to a species unknown to me, of a seeming peculiar northern type; the specimen was labelled as from St. Martin's Falls, Hudson Bay. I examined it carefully, and in my memory can see the specimen before me now. It was a dark stone-gray species, the concolorous primaries without any warm tinting shaded here and there with whitish, but quite obscurely, and allowing the usual lines and narrowly outlined stigmata to be clearly made out. The stigmata were defined and nearly concolorous, not contrasting. The insect reminded me mostly of the species described by Morrison as *Acronycta aspera*. I judged the specimen to have naked eyes, but had no opportunity of verifying this. The hind wings were concolorous, perhaps a little darker. There was not a trace of any reddish-brown, or brighter shading or colour. The whole insect was of a stony, somewhat fuscous or sordid dusty gray-hue. In my Illustrated Essay I noted this examination of mine as follows: "The type from Hudson Bay is not an *Acronycta*. The abdomen is tufted; the species is dark stone-grey, with kidney-shaped reniform, and seems a Hadenoid form unknown to me," l. c. 38. Under these circumstances I was greatly surprised to find by Prof. Smith's Revision that Mr. Butler had referred the specimen as belonging to *Mamestra lubens;* still more so that Prof.

Smith afterwards confirms the decision. That the specimen considered by Butler and Smith to be the "type" of *cristifera*, Walk., is really *lubens*, I do not doubt. But that this specimen was described by Walker and seen by me, I do not only doubt, but I shall try to show the impossibility of. Let me premise that, so far as I can find out, in every case where I have positively identified Walker's species, after seeing the Brit. Mus. Collection, my identification is adopted and verified afterwards by Prof. Smith, as a study of his synonymy will show. In every case but this; for even where, from the poor condition of the specimen, I only ventured to suggest the identity, as with *A. muraenula*, the supposition is confirmed. Let me also premise that, in the search for "types," Prof. Smith has not stopped to verify the supposed "type" by the description. Yet the description is the sole real authority for the authenticity of the "type." A number of times have I, in print, drawn attention to this fact, that when a supposed "type" contradicts the published description, the "type" must be held to be spurious. Not only does literature bring ample evidence that "types" have been subsequently made, but a mistake in labelling, a changing of the label, may not infrequently occur, and has often occurred as the result of accident. We may go further and say that a description must tolerably well conform to the appearance and character of the specimen, to be accepted as having been drawn up from it. But, in the present case, we may waive all such argument, weakened as it must be by Walker's poor descriptive methods. The description of *cristifera* simply contradicts the supposition that a specimen of *lubens* could have served for its basis. It bears out my independent testimony, written without consulting the B. Mus. Lists, that a sordid, dusky or "brownish" gray insect, without any brighter colouring, was before Mr. Walker. Accessory evidence is that *lubens* is not, so far as known, a northern species at all, not else known in the Hudson Bay collections; while the form I saw had the northern aspect of *Polia aspera*. Again, Mr. Walker's generic references are wild, but there is still some method in them. A moth to be referred by him to *Acronycta* must have something gray, black and white, about it, to say the least. Now *lubens* is not gray after this fashion. It is more brown than gray. It is very dark grayish with generally over all a distinct reddish flush and tinge, especially basally. The reniform spot is upright and yellowish, not kidney-shaped. Beneath it is even brighter coloured, tinged with carmine or bright red. The hind wings are not gray or "cinereous" at all, but

fuscous or smoky. The size is larger. *Lubens* is also altogether a comparatively gaily coloured Noctuid, with violet and purple-brown shadings. It recalls somewhat *Copimamestra brassicæ*, but not in any way does it resemble a dead stone-gray species, unicolorous in appearance. The lines are partly yellow; they cannot be described as "black, undulating and denticulated." The type I saw allowed the fine lines, single, if I remember rightly, to contrast and appear as if cut in the wing against the even paler ground colour. The reniform was wide, kidney-shaped, excavated outwardly. But let Mr. Walker speak for himself. That he described *Mamestra adjuncta* and *Xylomiges crucialis* as Acronyctas is true, but these have at least something of the *Acronycta* livery and colours. *Lubens* has nothing of this, and is well described by Smith in the Revision, p. 233, under *cristifera*. To this I can refer the reader. Here is Walker's description from the British Museum Lists, XV., p. 1654, 1858. The Latin diagnosis I can omit, since it merely translates the English text:

"Male.—Dark cinereous, brownish beneath. Thorax with black bands. Abdomen brownish-cinereous, with high black dorsal crests, tufted along each side, and with a large apical tuft. Forewings with some whitish hairs here and there, with black undulating and denticulated lines; orbicular and reniform spots and a third hindward spot mostly whitish; orbicular large, nearly round; reniform slightly excavated on the outer side. Hind wings brownish-cinereous, with whitish ciliæ. Length of the body 7 lines; of the wings 16 lines. This species much resembles *A. humamelis*, but is sufficiently distinct. *a*. St. Martin's Falls, Albany River, Hudson's Bay. Presented by Dr. Barnston."

Walker's comparison with *Acronycta hamamelis*, though wide of the mark, is only justified by the *Acronycta*-like gray of his "type," which wanted all warm *Mamestra*-like reddish-brown tints. He calls a dark or dusty fuscous-gray, a sordid stone-gray, "brownish-gray." There is not the faintest resemblance to *lubens* in his description, in which species the orbicular is dark centred, and in which character Walker's "type" agreed with his description in being without dark centre merely somewhat paler, more "whitish" than the wing. The type of *cristifera* was not rough and powdery like *lubens*, but nearly smooth. Could any sane entomologist compare *lubens* with *hamamelis*? I think not. There was no trace of purple, yellow, bluish-gray, violet, carmine or reddish-brown in Walker's

"tvpe," and there is none in his description. The type I saw of *cristifera* was evidently a male; what is the sex of the supposed "type," the specimen of *lubens*?

Walker's descriptions, though inadequate throughout, do not ever necessarily contradict his material. They generally vaguely agree, and though inadequate for identification are often sufficient as to the colour and markings of his specimens. With structure he was profoundly unacquainted in the Lepidoptera. But, while making every allowance possible, I submit that he never could have drawn up his description of *cristifera* from a specimen of *lubens*! It is rather his weakness to exaggerate, by not defining, small matters of shading in these sombre insects. He could not have failed to note the centrally spotted orbicular, the "creamy-yellow" upright reniform, the distinctly outlined claviform, the red flush, the blue-gray powderings, the yellowish subterminal line, the carmine tint beneath of *lubens*. Some trace of all these must have appeared in his words. There is none at all! He had a slighter *Polia*-like insect before him, which I saw, but could not locate definitely in my brief study. This specimen must in some way have become exchanged for a specimen of *lubens*, which may now stand there, but cannot in reason be considered his "type" of *cristifera*. I pass over what I believe is the fact, that Walker did not put the word "type" on a label attached to his specimens and that therefore, in rearranging the material, a mistake might readily occur. Were I to see his real "type" of *cristifera*, I should recognize it at once. Error is not out of the question because *lubens* is so strongly marked, as Prof. Smith would have us believe. The "error" is not as to the species, but as to the specimen! Why does not Mr. Smith study the British Museum Lists? Why adopt as infallible the testimony offered by the fact that the specimens in place *now* in the British Museum are really in every case Walker's identical "types"? Is there no margin for error here? It would seem that Prof. Smith has throughout adopted the theory that the specimens shown him as Walker's "types" must and are really always what they purport to be. Yet I have shown in this case that it may not always be so. I can put aside the fact that it is very unlikely that I should have been deceived in the case of so prominent a species, which, as Prof. Smith says, "must have been familiar" to me. Undoubtedly *lubens*, Grt., was well known to me, known as long as most of my moths. For a time, till 1875, I thought the species might be what what was called "*brassicæ*" in Europe. Is it not possible that this iden-

tical "type" of Walker's was what he called *brassicæ?* I have not the literature at the moment to refer to. It has no immediate bearing on my conclusion, which is this, that the species I have named in American collections *Mamestra lubens* must retain its name.

I do not belong to the school which would ignore the British Museum Catalogue altogether. As much as any one I have worked out Walker's species and generally adopted his names when earlier. It is true I lose more than any one else by Walker's insufficient descriptions. I do not object to this, for the reason that our main need is a stable nomenclature. This latter cannot be established by the procedure of taking a specimen as Walker's "type" which does not answer his published description. The real basis for our nomenclature is our literature. If *lubens* is dropped for *cristifera*, then this basis is fundamentally attacked. What is called a "type" supersedes it. But labelling a specimen can never constitute a publication. Walker's text must conform always and in every case sufficiently with his supposed "type," and at least not contradict it. In this case the description does not conform and does contradict the assumption of Mr. Butler. There may be other cases, but I have no means to look into them. I am quite willing that Walker's names should be restored and credited to him as if he had fully described his material. That so many of my species should be thus drawn in, is certainly no fault of mine. The labour of comparing Walker's "types" is no greater than than that of determining any other lot of specimens; but the labour used in trying to make out his descriptions will in almost every case be always in vain. After I had satisfied myself of this in 1868, I ceased to trouble myself to look through the Catalogues for a possible identification, which, in the best case, would be a doubtful one. It was much better to write recognizable descriptions of our Noctuidæ and run the risk with Mr. Walker. And when all is restored that can be restored to Mr. Walker, it may, I think, be said of my work with justice, that at a time when we in America had no names at all for our Owlet moths, I built up gradually a nomenclature which, for the greatest part, will endure.

Two other points remain to be elucidated. I am persistently credited by Prof. Smith with the description of *lorea* under the name *dodgei*. I have not the literature, but my memory is that I never described such a species, but that Mr. Morrison did. The last point relates to the type of *ferrealis*. I received this from Morrison's late Montana collections. It is very

distinct from *M. stricta (ferrea)*, and I think the type must now be with Mr. Neumoegen. It should be easily recognized. Prof. Smith has seen the types and recognizes the validity of twenty-nine (29) species of N. Am. *Mamestra* described by me. There remains then *lubens* to be reinstated and *ferrealis* to be again recognized, making thirty-one in all. I have lost four others through comparisons with Mr. Walker's "types."

FOLDED WINGS IN FŒNUS.

BY WM. HAMPTON PATTON.

Aside from the wasps distinguished by their folded wings (DIPLOPTERA) and the Chalcidian genus *Leucospis*, there is no record, unless of distant date, of any Hymenopterous insect having the wings folded. In *Coptera* the "longitudinal fold" described by Say is in reality a pleat or ridge: the wings, as I have repeatedly observed in the living insect, being laid flat upon the back and never folded.

I can, however, add from personal observation the Evaniad genus *Fœnus*, in which I have uniformly found the wings folded in a manner homologous to that of the hornets and *Leucospis* (*i. e.*, longitudinally through the middle, the fold crossing the median transverse vein and the two recurrents, the posterior half of the wing falling under the anterior half).

The position of the wing-fold is one of great morphological significance, as it indicates the line of separation between the two systems of veins in insect wings. The discovery of this fold in Evaniadæ proves the recently discovered relationship between these insects and the Diplopteryga.

On the eighth of May, 1879, at Waterbury, Conn., I bred a female specimen (of the common small species of *Fœnus*) from a larva found in the pith of a dead sumach twig in the preceding month. As no description of the larva of this genus exists, it is doubtful whether the larva found was that belonging to the Hymenopteron or was that of its host. The larva was apodous, of a very slight purple shade, and covered with fine down. There was no cocoon. The pupa is gray, the cast skin almost white, showing the peculiar features of the genus *Fœnus*.

BOOK NOTICE.

MISCELLANEOUS ENTOMOLOGICAL PAPERS. BY F. M. WEBSTER: Feb., 1894.

We have just received a neat pamphlet of 59 pages, which forms Bulletin 51 of the Ohio Agricultural Experiment Station. It is by Prof. F. M. Webster, and, like all his work, shows careful preparation.

The insects treated of in the first part are :—The Asparagus Beetle, the Western Corn Root-worm, the Broad-striped Flea-beetle, Blister Beetles, the Basket Worm, the Cabbage Aphis and the Apple-leaf Louse.

An interesting account of the insects which have been introduced into the State is given under the head of "Some Insect Immigrants in Ohio." There appear to have been two great highways which insects imported from Europe have followed : those which have entered the State at its north-eastern corner and spread westward, and those from Southern Europe which have generally entered by the way of the Ohio Valley and have a more or less restricted northern distribution.

In the article "Insect Foes of American Cereals" the writer is evidently dealing with a subject of which he has made a special study. By patient observation and the application of practical common sense, Prof. Webster has made some important discoveries in Economic Entomology. Not the least of these is the fact recorded in this pamphlet that the Apple Aphis passes part of the year as an injurious enemy on wheat. In fact Mr. Webster says : "So far as my observations go, it is more detrimental to the wheat than to the apple." This is an important discovery, and will doubtless draw the attention of entomologists to this important subject of the "Alternation of Generations" among the Aphides—a line of investigation which has engaged much of the time of Messrs. Riley and Howard at Washington. Speaking of remedies, Prof. Webster says : "It would appear almost visionary to advocate spraying apple orchards with kerosene emulsion in mid-winter to protect the wheat crop, but nevertheless one of the most serious enemies of young fall wheat passes its egg stage on the twigs of the apple during the winter season. I refer to the Apple-leaf Louse, *Aphis mali*, Fab."

"Soon after the young wheat plants appear in the fall the winged viviparous females of this species flock to the fields, and on these give birth to their young, which at once make their way to the roots, where they continue reproduction, sapping the life from the young plants—

* * * * though they are seldom killed outright, these infested plants cease to grow, and later take on a sickly look, and not until the Aphis abandons them in the autumn to return to the apple, do they show any amount of vigour. It is very seldom that the affected plants fully recover at least in autumn; and the result must be to reduce their productiveness the following year." The eggs of the Apple-leaf Aphis are deposited on the twigs and limbs of apple trees late in the autumn; these do not hatch until the following spring; the plant-lice remain on the apple trees for two or three generations, when winged females are produced, which fly to grasses and weeds and there pass the summer. After the young wheat is up in the autumn, the lice congregate on the plants and reproduce rapidly.

The above is briefly the life-history of this insect in Ohio as worked out by Prof. Webster by careful experiments, which are detailed in the Bulletin. At Ottawa this probably may also, to a large extent, be the case; but the Aphis is also sometimes abundant on young apple trees right through the season. It is, however, seldom injuriously abundant in Ontario, although in British Columbia it is to-day one of the most serious enemies of the apple grower.

Professor Webster's papers will doubtless cause many other entomologists to study this insect more closely, when it is probable that further discoveries will be made, perhaps not less interesting than that now discussed. J. F.

CORRESPONDENCE.

BELLURA DIFFUSA.

Sir,—In Dr. Smith's catalogue of the Lepidopterous superfamily Noctuidæ, found in Boreal America, on page 181, under *Bellura diffusa*, Grote: he states, "I have not seen the type of this species." In the March No. of CAN. ENT., Vol. 26, p. 85, referring to that statement, Mr. Grote says, "Where my type is now I cannot for the moment recollect. It seems not to be in the British Museum." When Mr. Grote, then of Buffalo, identified my specimen, he expressed pleasure at seeing the species again, remarking that he had not seen it since he had first named it; which I understood from what he said was about a year previously, indicating that it was not then in his collection. And the impression left on my mind from his conversation was, that he had seen but one specimen before, and that he had returned it after naming it. All this is distinctly impressed upon my memory, right or wrong, and my stating it may assist Mr. Grote in recalling the transaction, and give him a clue to where the type is now to be looked for. J. ALSTON MOFFAT.

Mailed May 3rd.

The Canadian Entomologist.

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THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

I. The Cicindelidæ of Ontario and Quebec.

[The following is the first of a series of papers which Mr. Wickham is specially preparing for this magazine. It is intended that they should treat of all the more conspicuous families of Coleoptera and present in tabular form the genera and species that are found in the Provinces of Ontario and Quebec; a descriptive list will also be given of the species, so far as known, that are to be found in the other provinces of the Dominion of Canada. The object in view is to assist collectors who have hitherto been unable, from the want of books or other causes, to identify the beetles they have caught, and to encourage them in the study of this most interesting order of insects. As many illustrations as possible will be given, and every effort will be made to render the papers thoroughly helpful to those who make use of them. It is hoped, also, that the aid thus given will lead on many of our younger readers to become students of Entomology, rather than mere collectors. The bibliography at the end of each paper will be of service to those who are not content to remain "beginners."—Ed. C. E.]

The beetles of this family are among the first to attract the attention of the collector. Their graceful forms, bright colours, and activity displayed in the pursuit of their prey, on sunny banks or roadsides, render them at once objects of interest and beauty; as much on this account as because of their generally conceded position as the highest of Coleoptera, they are given the first place in this series of articles.

For our purpose the Cicindelidæ may be defined as predaceous ground-beetles, with eleven-jointed filiform antennæ, which are borne on the front above the base of the mandibles. Two genera are represented in the Dominion of Canada, one of which, *Omus*, is confined to the Pacific provinces. It is distinguishable from *Cicindela* by having small eyes and separate posterior coxæ, while in the latter genus the eyes are large and prominent and the posterior coxæ contiguous.

Fig. 11.

The larva of Cicindela (fig. 11, *C. vulgaris*) is a somewhat elongate, whitish grub, with a broad, metallic coloured head and prothorax, and a large hump, bearing two hooks, on the fifth abdominal segment. They excavate holes in sunny spots and lie in wait for prey, with the head closing up the mouth of the burrow; when an insect comes within reach it is seized by the long jaws of the larva and the juices extracted. I am now rearing larvæ of *C. limbalis*, Klug, which I dug from holes in a clay bank on the fifteenth of April. They are easily kept in little tin boxes with damp earth, and feed readily on soft-bodied larvæ of wood-borers. The pupa is figured by Letzner * and is represented as bearing on the fifth abdominal dorsal, two long spines corresponding to the hooks on the same segment in the larva.

The perfect insects are to be found in all parts of North America south of the sixtieth parallel, or at least extend very nearly that far north, though more numerous in warm climates. The colours are usually metallic, the elytra more or less spotted and banded with white. When these markings are of the style shown in the figure of *C. hirticollis* (fig. 16) they are said to be *complete;* if, as is sometimes the case, they are reduced to partial obliteration or breaking up of these bands, they are called *incomplete.* The curved mark on the shoulder is known as the humeral lunule, the one at the tip the apical lunule, while the long bent mark extending nearly across the middle is called the median band. An important character, which is to be used in assigning species to their proper places in the table, is to be found in the labrum or upper lip; in most of our species it is short, but in *C. longilabris* it is very long. The free edge is variously toothed in the Canadian species. The legs furnish no characters that we can employ with profit, but it will be noticed that the males have three joints of the anterior tarsi dilated and silky pubescent beneath, the middle tibiæ being pubescent on the outer side.

Of the twelve tiger-beetles reported from Ontario and Quebec, the following five are considered varietal forms only:—*C. Lecontei* figures as a variety of *scutellaris*, *limbalis* and *splendida* both belong to *purpurea*, *generosa* is an Eastern form of *formosa*, and *12-guttata* is subordinate to *repanda*, being simply a variety in which the bands are broken up. The variety of *longilabris*, which is called *perviridis*, is known from Newfoundland, but I think not from the provinces which are directly the

* Zeitschr. f. Entom. Breslau, 1848, Taf. 2. *(C. campestris.)*

subject of this paper. They may be separated among themselves as follows, though occasionally forms will be found which intergrade between varieties to such an extent as to render it difficult to place them correctly from description alone. The arrangement followed is practically that of Schaupp, with such additions and alterations as were rendered possible or convenient by the smaller number of species here treated.

CICINDELA, Linn.

A. Labrum very long, one-toothed. Thorax flattened, trapezoidal.
Dull brown or black above, front of head excavated. Elytra distinctly punctate, usually with a slightly bent, nearly transverse median band, and three spots on or near the margin which is not bordered with white..... *longilabris*, Say,
Green above and beneath, humeral lunule complete..... *perviridis*, Schaupp.

B. Labrum short or only moderately long. Thorax not greatly flattened, quadrate or trapezoidal.

b. Thorax much narrowed behind; colours usually bright, either purplish, green, blue or coppery. Markings often very much reduced or incomplete.

c. Elytra without well-defined median band.
Markings marginal only, colour purplish-coppery, elytra indistinctly punctured, front of head sparsely pilose..... *Lecontei*, Hald.
Markings consisting of small white or golden dots, usually marginal only, but discal ones are often present. Colour bright green. Elytra distinctly punctured, front of head not pilose..... *sexguttata*, Fab.

cc. Elytra with median band distinct. Front of head pilose.
Thorax and elytra coppery or greenish coppery, margin green. Body beneath bluish-green. *purpurea*, Ol.
Thorax and elytra purplish, body beneath blue..... *limbalis*, Lec.
Thorax green or blue, elytra coppery, body beneath green or blue..... *splendida*, Hentz.

bb. Thorax slightly or not at all narrowed behind. Colours sober, brownish with white markings which are usually complete.

d. Markings complete, very broad, connected at margin. Body very hairy, labrum three-toothed. Humeral lunule oblique posteriorly..... *generosa*, Dej.

dd. Markings narrower, complete or incomplete. Humeral lunule with the posterior extremity much prolonged *backward* and but little curved. Labrum three-toothed. ..... *vulgaris*, Say.
Humeral lunule with the posterior portion incurved; marginal white line not extending quite to this lunule. Markings complete, not broken. Labrum one-toothed..... *repanda*, Dej.
Humeral and other markings broken up.. *12-guttata*, Dej.
Humeral lunule with the posterior portion very suddenly turned inwards, at right angles to the suture or nearly so. Marginal white line connected with humeral lunule..... *hirticollis*, Say.

bbb. Thorax subcylindrical. Markings almost absent. Slender, black, shining, a row of large greenish foveæ near the suture. Apical lunule complete, the other markings usually very much broken or wanting. Labrum one-toothed..... *punctulata*, Fab.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

We offer figures of several species, as follows:—*Cicindela sexguttata* (fig. 12), *C. purpurea* (fig. 13), *C. generosa* (fig. 14), *C. vulgaris* (fig. 15), and *C. hirticollis* (fig. 16).

By request of the Editor, a list of other species and varieties reported from the Dominion is subjoined, with localities. They are not included in the table because they are not known from Old Canada, and our knowledge of the fauna of the great region north of the forty-ninth parallel and west of the ninety-fifth meridian is too limited to permit of a synoptic treatment of any completeness. For several unpublished records I am indebted to the kindness of Mr. Harrington and Mr. Fletcher, who sent me lists of the species contained in their collections.

The species are :—

Omus dejeanii, Reiche. B. C., Van. Isl. A large back insect, 18 to 20 mm. in length, the elytra marked with rather deep, irregular foveæ.

O. Audouinii, Reiche. B. C., Van. Isl. Resembles the preceding, but the size is less (13 to 18 mm.) and the elytra simply irregularly punctate. The species of Omus do not resemble Cicindela in appearance, but approach rather the Carabidæ, from which they may be easily separated by the antennal characters.

Cicindela longilabris, var. *montana*, Lec. Resembles *longilabris* proper, but is black, shining, smoother, the markings absent or only a slender median band present. Has been found in the Northwest Territory. J. B. Tyrrell (teste Harrington).

C. scutellaris, var. *unicolor*, Dej. Like *Lecontei*, but green or blue, without marks of any kind. Taken by J. B. Tyrrell in the Northwest Territory.

C. sexguttata, var. *patruela*, Dej B. C., Rev. Geo. W. Taylor. This is a variety of *sexguttata* in which the middle band is more or less distinct.

C. purpurea, var. *decem-notata*, Say. This is a form in which the middle band is more deflexed than in typical *purpurea*. The elytra are ordinarily ornamented also with four white dots. B. C. (teste Leconte).

C. formosa, Say. Fort McLeod (teste Fletcher), also in N. W. T. This is like *generosa*, but the ground colour is reddish cupreous instead of brown.

C. hyperborea, Lec. Methy Portage, H. B. T. (teste Leconte). I have never seen this species. It is rather small (12 mm.) reddish cupreous with markings somewhat resembling *vulgaris*, but the hinder portion of the median band is straight instead of being curved.

C. vulgaris, var. *vibex*, Horn. Vanc. Isl., Rev. G. W. Taylor (teste Harrington). A green variety of *vulgaris* in which the median band does not reach the margin.

C. oregona, Lec. A variety of *repanda*, brownish-bronze or olive, middle band not dilated on the margin. White dots large, lunules interrupted. B. C., Van. Isl.

C. pusilla, Say. Hudson's Bay Terr. (teste Schaupp). A small black species, (12 mm.) blue or greenish beneath, with tibiæ pale at base, labrum three-toothed. Elytra with faint basal and apical lunule and recurved median band extended on margin. All but the marginal part of this band is sometimes wanting. Unknown to me.

C. pusilla, var. *terricola*, Say. Black beneath, differs from typical form in having oblique punctures on the elytra, the anterior margin of each puncture being the higher. Hudson's Bay Terr. (teste Schaupp).

C. cinctipennis, var. *imperfecta*, Lec. A small species, 11 to 12.5 mm., brown above, the elytra with a long humeral lunule, which is usually connected with the median band. The median band does not touch the margin and its outer part is sometimes connected with the apical as well as the humeral lunule. B. C., A. J. Hill (teste Harrington).

C. lepida, Dej. Elytra white with a few green or bronzed lines. Anus testaceous, labrum one-toothed. Northwest Territory (teste Harrington).

It is to be hoped that the readers of the CANADIAN ENTOMOLOGIST, who have the opportunity to add other species to the lists of beetles of the Dominion, will take care to see that the records of their captures are published, as only in this way can faunal papers be made complete. Personally, I should be very glad to see any Cicindelas which appear not to come under the species mentioned in this article, whether in duplicate or otherwise. To those who wish to pursue the study further, the following works are recommended as containing nearly all that is known on the Cicindelidæ of North America :—

1818. Say, Thos. A monograph of the North American insects of the genus Cicindela. Trans. Am. Phil. Soc., N. S., I., 401-426. Reprinted in Leconte's Edition of the Complete Writings of Thos. Say, Vol. II., pp. 415-435, Boston, n. d.

1856. Leconte. John L. Revision of the Cicindelæ of the United States. Trans. Am. Phil. Soc., 2nd Ser. XI., pp. 27-62, Pl. I.

1876. Horn, Geo. H. The sexual characters of North American Cicindelidæ, with notes on some groups of Cicindela. Trans. Am. Ent. Soc., V., pp. 232-240.

1878. Horn, Geo. H. Descriptions of the larvæ of the North American genera of Cicindelidæ * * * Trans. Am. Ent. Soc., VII., pp. 28-37, Pl. II.

1878. Schaupp, F. G. On the Cicindelidæ of the United States. Bull. Bklyn. Ento. Soc., I., pp. 11-14, with a plate.

1883. Schaupp, F. G. Synoptic tables of Coleoptera. Cicindelidæ. Bulletin Brooklyn Ento. Soc., VI., 73-108, Pl. 1-5. This is the latest work on the subject, and gives descriptions, with coloured figures, of all species and varieties known from North America.

THE BUTTERFLIES OF LAGGAN, N. W. T.; ACCOUNT OF CERTAIN SPECIES INHABITING THE ROCKY MOUNTAINS IN LATITUDE 51° 25'.

BY THOMAS E. BEAN, LAGGAN, ALBERTA.

(Continued from page 149, Vol. 25.)

ARGYNNIS APHIRAPE, VAR. OSSIANUS, HERBST.

My local material allied to the European *Aphirape* consists of 22 males, 11 females. These have been studied in comparison with 3 ♂, 1 ♀ typical *Aphirape* from Germany, 2 ♂ 2 ♀ *Aphirape* var. *Ossianus* from Northern Finland, 1 ♂ *Ossianus* from Sweden, 1 ♂ 1 ♀ *Aphirape* var. *Triclaris* from Labrador, and 3 ♂ 1 ♀ *Triclaris* collected by Mr. H. K. Morrison in southern Colorado. In the local series the following relationships are displayed:—One male is *Triclaris*, agreeing closely on upper surface with the Colorado males, but on the under side nearer to the single Labrador male. Five males and four females are *Aphirape* var. *Ossianus*. The remaining 16 males and 7 females are of an intergrade type, combining features of *Ossianus* and *Triclaris*. On under side these compare closely with my Labrador pair of *Triclaris*, having the spots of secondaries mainly surfaced in nacre and very conspicuous. On upper side, however, they are distinctively of the *Ossianus* type.

Triclaris is by some authors considered a distinct species. The examination I have now made results adversely to that view. As above shown, the Laggan material contains over 25 per cent. of examples which are formal *Ossianus*, with about 75 per cent. of specimens combining the character of *Ossianus* upper surface with an extreme degree of *Triclaris* quality below. In order to make a reasonable plea for the distinctness of *Triclaris* from *Aphirape*, it would be requisite to prove that *Ossianus* and *Aphirape* in the European fauna are mutually independent. For *Ossianus* certainly is a resident in the bogs of Laggan, and just as surely the Laggan intergrade series identifies *Triclaris* with *Ossianus*.

In the Laggan series appears nothing very close to typical *Aphirape*. In fact, 75 per cent. of the Laggan occurrence is at the farthest point of separation from *Aphirape*.

Triclaris of Colorado is the North American form nearest to typical *Aphirape*, which it greatly resembles on upper side, and the Laggan form as markedly resembles *Ossianus*. It is also worthy of special note that in *Triclaris* of Colorado, as in typical *Aphirape*, the colour-pattern is

emphatically differentiated for sex ; while in the Laggan occurrence, as also in *Ossianus* of Europe, the sexes differ but slightly in appearance.

Ossianus flies at Laggan during July, or in forward seasons makes its appearance the last week of June. My earliest date for the male is June 22 (in 1888, an early season). It is found at altitudes from 4,900 to 5,600 feet, usually in marshy places. It is not common anywhere in the district, but occurs more freely than elsewhere in two subalpine bogs about a mile south of Laggan, at 5,400 and 5,500 feet. I have taken the female at Stephen, B. C., (5,290 feet), and the male at Emerald Lake (5,600 feet). At Emerald Lake occurred also the single instance of formal *Triclaris* previously mentioned.

A METHOD OF SECURING MOTHS' EGGS.

BY JOHN B. LEMBERT, YO SEMITE, CAL.

A practical way of procuring moths' eggs came under my observation last season and the season before, through an *Arctia ornata* ♀ that I sent to Mr. Dyar while he was in Portland, Oregon.

When I take an *Arctia ornata* ♀, and she is ready to lay eggs, the moment she shows signs of being stupefied in the Cyanide bottle I take her out, close the wings over her back, and place her in a paper envelope ; as soon as she revives, she will commence to scratch the paper with her legs ; I then shake the envelope, and if she has given up some eggs, I take them out, give her another dose of Cyanide fumes, and when she revives a second time I have found as many as 125 eggs in the paper. After she has given up this quantity the ♀ usually dies, even when left to her own ways and means, and I have found them dead as perfect as when they had just issued and were alive.

Euchaetes sciurus, *Arctia rufula* and *Spilosoma vestalis* will give up eggs in this way also, and die like *Ornata*.

A *Lepisesia Clarkia* ♀ has given up an egg in the Cyanide bottle, but as it is so easily killed by the Cyanide fumes, I never tried to get eggs from it in that manner.

Of butterflies, the *Colias Behrii* ♀'s have given up one and two eggs at a time in this way. The method can no doubt be improved on, and, by careful manipulation, the eggs of a great number of butterflies can be obtained in a short time by those intending to rear larvæ, and where the food-plant is known it will make work so much easier for the entomologist.

I my remark, also, that in a tube the eggs of *Spilosoma vestalis*, without the aid of any plant moisture, take about three weeks to hatch, as do also those of *Arctia ornata*, if not longer.

NEW CYNIPIDAE.

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

RHODITES, Hartig.

R. AREFACTUS, *n. sp.*

The galls are dense, corky enlargements of small shoots, usually close to the stem from which the shoot arises, and the shoot is usually dead beyond the gall when the latter is mature. The galls are irregular in shape, vary from one-half to seven-eights of an inch in diameter, and are polythalamous. The surface is of a rusty colour, is finely wrinkled, and reminds me of dried fruit. The surface appears dry and hard, but it is easily dented with the finger-nail and is always free from spines.

Described from eighteen galls collected in March in the vicinity of Fort Collins, Colorado. Galls brought into the laboratory March 7th, began giving flies March 23rd.

Gall-flies.—Females—General colour, cinnamon-rufous; head entirely rufous, except a blackish area between either compound eye and the mouth; under a power of 60 diameters the lower face appears rather coarsely wrinkled, the wrinkles converging towards the mouth, the upper face, vertex and occiput very finely rugose; the face sparsely set with a short gray pubescense; antennæ short, the first three joints, and sometimes the base of the third, rufous, the remaining joints black; number of joints, 14. *Thorax*, rufous above, with a black suture separating the mesothorax and scutellum, parapsidal grooves entire, broad, moderately deep, well separated at the scutellum, and with numerous elevated lines crossing them; median groove distinct and extending well forward. The surface of the thorax is finely rugose, and, in a proper light, shows numerous punctures, each puncture bearing a short yellowish hair. Scutellum, coarsely wrinkled near the margin, and less coarsely wrinkled on the central portion, which is considerably elevated, transverse groove at base, colour rufous. Mesopleura, except spot just beneath the wings, rufous, sutures, metathorax and sternum black or blackish; entire pleura rugose. *Abdomen* rufous, with venter and posterior half of dorsum blackish, all abdominal segments covered with a microscopic network of impressed lines, most prominent on the terminal segments. *Wings* but little smoky, radial area not at all closed along the costal margin, areolet distinct and rather small. *Feet*, including the coxæ, entirely rufous, the claws only being black. Length, from 3½ to 4½ mm.

Described from twenty-one specimens bred from the galls.

Males—Three to three and one-half mm. in length, black, feet more reddish in colour than in the females, bases of the coxæ black, antennæ black throughout; otherwise like the females.

Described from forty-two bred specimens.

There is one male among those reared that has the rufous marking of the female on head, antennæ and thorax.

This species resembles very closely *Rhodites multispinosa*, Gill, but the galls are very different.

R. NEGLECTA, *n. sp.*

The gall is an abrupt, corky enlargement of a small stem, and contains numerous larval cells. The gall measures 15 mm. in breadth by 18 mm. in length, and is very smooth on the exterior.

Described from a single gall taken at Manitou, Colorado, May 8, 1892. The flies emerged on the 17th of the same month.

I have long known what I suppose to be the same gall in Michigan and Iowa, but never before succeeded in getting the gall-makers from them.

Gall-fly.—Female—*Head* black, except a little rufous upon the vertex and clypeus; face rather coarsely rugose, vertex and occiput finely rugose; antennæ entirely black and 14-jointed. *Thorax* entirely black, parapsidal grooves well defined and broadened anteriorly, median groove traceable but a short distance from the scutellum. Surface of the mesothorax shining, but under a low power of the microscope is seen to have a fine network of impressed lines and numerous shallow punctures over the entire surface; from each puncture arises a small yellowish hair. Scutellum black, slightly rufous on middle of disk, coarsely rugose about margin, less coarsely on the central raised portion. Pleuræ and mesothorax black and coarsely to finely rugose, most finely on the central portion of the mesopleuræ beneath the forewings. Abdomen black, except sides of second segment near the base, the seventh segment and the anterior portion of the venter. All the surface of the abdomen is covered with a network of microscopic impressed lines. *Wings* slightly smoky, radial area not at all closed along the costal margin. *Feet* rufous, except coxæ, which are blackish. Length, 2½ to 3 mm.

Described from two bred females.

Male—Except feet, entirely black; length, 2½ mm.; otherwise like females.

Described from one bred specimen.

R. FULGENS, *n. sp.*

Gall unknown.

Gall-flies.—All females, measuring from 2¾ to 4 mm. in length; general colour, rufous. *Head*, dark rufous, beneath the eyes and back of the eyes at the sides of the vertex washed with blackish; in small individuals the head is darker in colour, in some entirely black, with the exception of a narrow streak in the middle of the face; there is also, in every case but one, some rufous colouring upon the genæ. Lower face rather coarsely rugose, vertex and occiput finely rugose, ocelli and compound eyes whitish, in one case red, in no case black; antennæ 14-jointed, the first three joints rufous, the remainder black. *Thorax*, rufous quite dark in the small individuals, parapsidal and median grooves well defined, all extending to the collar; ridges outside the parapsidal grooves and between these and the median groove smooth and shining and sparsely punctured. Under a power of 60 diameters these smooth polished portions are seen to have the fine network of impressed lines which is so constant in this genus. Scutellum coarsely rugose towards the border, where it is blackish, more finely rufous on the raised central portion; no foveæ, but the usual transverse groove. Metathorax, a patch on mesopleura beneath the wings, and sternum black; in small specimens the whole mesopleura is black, except a shining rufous spot beneath the wings, entire pleuræ finely to coarsely rugose. *Abdomen* rufous, somewhat blackish on dorsum and venter, all the segments covered with the network of impressed lines, but they are too fine to be seen with a low power on the sides of the second segment. *Wings* slightly and evenly smoky, nervures slender, with no cloudiness surrounding them, brown in colour, the heaviest not being black, areolet medium, radical cell not at all closed along the costal margin. *Feet*, including coxæ, entirely rufous, in the smallest and darkest individuals the coxæ somewhat blackish at base.

Described from 17 flies sent me by Prof. J. M. Aldrich, from S. Dakota, and 11 flies bred in this laboratory. The galls in both cases have been lost or confused with others. The flies are at once separated from *R. multispinosa*, *R. arefactus*, and what I suppose to be Riley's *R. tuberculator*, which they much resemble, by the polished mesothorax and the greatly developed median groove.

WASHINGTON PHALANGIDA, WITH DESCRIPTION OF A NEW SOUTHERN LIOBUNUM.

BY NATHAN BANKS, SEA CLIFF, N. Y.

During the past few years Mr. Trevor Kincaid, of Olympia, Washington State, has kindly sent me many interesting arachnids from that region. Among them quite a number of phalangids, some of which have been described, others will be given in this paper. Previous to my descriptions of Californian and Washington phalangids of last year, but one species (*Liobunum exilipes*, Wood) was known from the Pacific region; I have described and recorded fifteen others. These, with the four new ones described below, make a total of twenty; probably as many more remain to be described. To an Eastern student this fauna is very interesting because of the number of peculiar forms not known in the Eastern States. The families and genera may be separated by the following table :—

1 { A compound claw to posterior tarsi, palpi very spiny. .....(Phalangodidæ) *Sclerobunus.*
  { All tarsal claws simple. 2

2 { Last joint of palpus with a claw.....(Phalangidæ).....6
  { Last joint of palpus without a claw. 3

3 { Palpi very short, coxæ united.....(Trogulidæ) *Dendrolasma.*
  { Palpi long, coxæ separate.....(Nemastomidæ).....4

4 { Mandibles longer than body..... *Taracus.*
  { Mandibles shorter than body.....5

5 { Palpi slender..... *Nemastoma.*
  { The joints much swollen ..... *Phlegmacera.*

6 { Femur I. longer than body, palpal claw denticulate, lateral pore oblong ..... *Liobunum.*
  { Femur I. shorter than the body, palpal claw smooth, lateral pore nearly circular.....7

7 { Eye-tubercle and anterior margin of cephalothorax spiny..... *Homolophus.*
  { Eye-tubercle and anterior margin smooth..... *Leptobunus.*

SCLEROBUNUS, Banks.

Both species of this genus occur in the State.

Colour red, tips of legs black..... *robustus.*

Colour brown, tips of legs yellowish..... *brunneus.*

Sclerobunus robustus, Pack.

Phalangodes robusta, Pack. The Cave Fauna of North America, 1888.

This species is quite common from Colorado north-westward to the Pacific.

Sclerobunus brunneus, Banks. Trans. Am. Ent. Soc. 1893.

This is not uncommon near Olympia.

TARACUS, Simon.

Taracus pallipes, n. sp.

Length of body, 6 mm.; mandibles, 9 mm.

Colour—Cephalothorax pale, with a broad, black, median stripe, as wide as the base of the mandibles; abdomen dark gray above with black spots; venter pale, darker near tip; legs pale, except tarsi, which are mostly black; mandibles black; palpi pale, except last joint, which is dark brown.

Cephalothorax smooth, with a prominent median spine behind the eye-tubercle, the latter with several small projections, each tipped with a hair; anterior margin of cephalothorax strongly bi-emarginate. The dorsum of the abdomen has many conical tubercles of various sizes; none, however, large; they are somewhat irregularly arranged in transverse rows; these tubercles are black, and have their base surrounded by a black ring. Femur II. is as long as the basal joint of the mandibles, which is equal to three-fourths of the body; the femur of the palpus is longer than the femur of leg I. and shorter than femur II.; the last joint of palpus is about one-fourth the length of the penultimate joint; the basal joints of the mandibles have many small elevations, each bearing a hair.

Locality—Washington State, one male and one female.

This species is larger, much less spiny, and darker coloured than *T. spinosus;* the mandibles slightly longer and the legs more slender than in that species. Some young specimens, one millimetre long, have the mandibles much shorter than in the adult, thus plainly showing that the genus has developed from forms with normal mandibles.

PHLEGMACERA, Packard.

Phlegmacera occidentalis, Banks. Psyche, Feb., 1894.

This species is quite frequent near Olympia.

NEMASTOMA, Koch.

Nemastoma modesta, Banks. Psyche, Feb., 1894.

This is common in California and Washington.

DENDROLASMA, Banks.

Dendrolasma mirabilis, Banks. Psyche, Jan., 1894.

Uncommon; I have but two specimens.

LIOBUNUM, Koch.

The three species known to me may be separated as follows, applying especially to the males:

Palpus with tibia, patella and tip of femur dark brown, dorsum mostly blackish ..... *exilipes.*

Palpus and dorsum paler.

Spinules on venter and coxæ, trochanters brown, a brown median stripe on dorsum..... *pacificum.*

Only stiff black hairs on coxæ and venter, trochanters pale, a large cruciate mark on the abdomen..... *parvulum.*

Liobunum pacificum, nov. sp.

Length, ♂ 4.2 mm.; femur I. 5.8 mm., tibia I. 4.5 mm., femur IV. 9 mm., tibia IV. 6.8 mm. Dorsum, dirty white to gray, with a broad median brown stripe above, which is nearly equal in width throughout, barely wider at middle of abdomen; two diverging white stripes run from the eye-tubercle to the anterior margin of the cephalothorax; a few brown spots on each side of cephalothorax; venter coxæ and palpi whitish; legs dirty white, trochanters brown, patellæ and tips of femora and tibiæ light brown, tarsi brownish; basal joint of mandibles with a brown line above. Eye-tubercle moderate, with a few blunt processes above. Palpus with spinules, largest on femur; none of the joints have their angles prolonged; tarsus nearly straight, as long as patella plus tibia, claw with a few small teeth near base. Dorsum of abdomen granulate. Coxæ, trochanters, sternum and ventral segments with spinules; a white spine on inner tip of coxæ I. and II.; legs with short stiff hairs, three or four false articulations in metatarsus I., none in tibia II.

♀ length, 7 mm., femur I. 6.2 mm. Similar to the ♂, but the brown stripe is usually broken up into small patches on the cephalothorax, and indistinct on the posterior half of the abdomen; the spinules on the palpi are smaller, and there are but three or four on each side of each ventral segment.

Sometimes the legs are brownish and the dorsum suffused with brown.

Numerous specimens, ♂ and ♀, from Olympia, Washington.

Liobunum exilipes, Wood.

Phalangium exilipes, Wood, Bull. Essex Institute, Vol. VI., p. 23. This was described from California and Nevada; I have a number of specimens which agree quite well with the description, but in most of them there is a broad yellow band near the middle of the abdomen,

behind which the dorsum is much spotted; in front it is black, with a few spots on each segment; the patellæ of the legs are dark brown; only in a few specimens are the white lines in front of the eye-tubercle bent to form a white margin; the palpus has the tibia, patella and tip of femur black only in the male.

Olympia, Washington, ♂ and ♀.

Liobunum parvulum, nov. sp.

Length, ♂ 4 mm.; femur I. 5 mm., tibia I. 4 mm, femur IV. 7 mm., tibia IV. 5.2 mm. Dorsum grayish, with a large spot on abdomen in the form of a Greek cross, mostly brownish, but paler within, the truncate tip reaching just beyond the middle of the abdomen; on the cephalothorax several dark brown patches, more or less connected; no distinct lines from the eye-tubercle to the anterior margin; palpi whitish, with a brown line above on patella and base of tibia; venter, coxæ and trochanters white; legs pale, with broad brown bands at tips of femora and tibiæ, less distinct ones on middles of these joints; patellæ brown, tarsi mostly blackish. Eye-tubercle very low and smooth. Coxæ, trochanters, venter, sternum, palpi and legs with short stiff black hairs, no spinules, a white spine on inner tips of coxæ I., II. and III. Several false articulations in metatarsus I., three or four in tibia II. Tibia of palpus straight, much longer than patella, tarsus slightly curved; about as long as tibia plus patella; claw with a few fine teeth near base, none of the angles of the joints prolonged.

♀ Length, 5 mm.; femur I. 4.2 mm. Similar to male; mandibles slightly brownish, margin of abdomen deeper gray, ventral segments with a few brown spots. The ovipositor is extruded; it is about half as long as body, cylindical and ringed, blackish in the middle.

Two males and one female, Olympia, Washington.

LEPTOBUNUS, Banks.

I have several specimens of a species belonging to this genus, but as they are all young, I will not describe them.

HOMOLOPHUS, Banks.

I would consider *Mitopus biceps*, Thorell, as a Homolophus, though the last joint of the palpus is longer than the two preceding; a better character for the genus is the presence of the two prominent supra-mandibular teeth. Mitopus, Thorell (of which *M. Morio*, Fab., was made the type), differs from Oligolophus in having no spines to the femur of palpus. *O. montanus*, Bks., would thus be a Mitopus. From Washington and

Idaho, I have another species of Homolophus, differing from *H. biceps* in the longer body, more spinose character, and in coloration.

Homolophus punctatus, nov. sp.

Length, ♂ 4 mm., breadth, 2 mm.; femur I. 2.6 mm., tibia I. 2 mm., femur IV. 4 mm., tibia IV. 3 mm. Dorsum pale brownish, with a great many small white spots and darker brown punctures; eye-tubercle with a broad white stripe above; a bifid white stripe from eye-tubercle to anterior margin; venter, sternum and coxæ whitish, stigmata and some spots on the venter, brown; trochanters white; legs brownish, darker on patellæ and ends of tibiæ; palpus with tibia, patella and most of femur black, tarsus paler; basal joint of mandibles brown above. Dorsum with many spinules, a pair of elevations on anterior margin of cephalothorax each bearing eight or ten small spines; two rows of small spines above on eye-tubercle; two prominent white supra-mandibular teeth; lateral pore nearly circular; no spinules on coxæ except on sides near tip; a white spine on inner tip of coxæ I and II; sternum and venter smooth; legs with femora, patellæ and tibiæ quite stout, and with spinules; a false articulation in metatarsus I., none in tibia II.; palpus short, basal joints very stout, with a few spinules and many short, stiff, black hairs; tarsus curved, not quite as long as tibia plus patella, with blunt spinules beneath; claw smooth.

♀ length, 5 mm., breadth, 2.4 mm Similar to male, but the median stripe is more distinct.

One ♂ Olympia, Washington; one ♀ Bear, Idaho [L. M. Cockerell].

Liobunum flavum, nov. sp.

Length, ♂ 5.5 mm., breadth, 4 mm.; femur I. 1.3 mm., tibia I. 8 mm., femur IV. 17 mm., tibia IV. 12 mm. Wholly yellow, an indistinct trace of a brown vase-mark on abdomen, patellæ of legs faintly brownish, tarsi whitish; cephalothorax with a few yellow-brown spots; eyes black. Dorsum hard, nearly coriaceous, covered with spinules; venter, sternum, coxæ, trochanters and femora with spinules, quite large on the coxæ; cephalothorax broad; eye-tubercle with a few spinuels; a row of plates on each side of each coxa; a spine on inner tips of coxæ I., II. and III.; several false articulations in metatarsus I. and two or three in tibia II.; palpus slender, with a few spinules, tibia but little longer than patella, tarsus curved, longer than tibia plus patella, claw with a few small teeth near base.

♀ Length, 8 mm., femur IV. 13 mm. Similar to ♂, but a little more browish, legs shorter and more reddish, fewer spinules on the venter, body softer.

One ♂, Shreveport, La.; one ♀, Harper's Ferry, W. Va.

The appearance of this species is somewhat like *L. verrucosum*, but the trochanters are pale and there is no golden tinge. It is more closely related to *L. ventricosum*, but has longer and lighter legs, with a more spinose body.

FLORIDA APHORURIDÆ.

[The following letter was communicated to me by Dr. Leonhard Stejneger, U. S. National Museum, through Mr. E. A. Schwarz. It is of particular interest, giving new localities for two species and adding one to our faunal list. ALEX D. MACGILLIVRAY]:—

During my sojourn in Florida, 1892–93, I happened to collect some small insects, Collembola, of the family Lipuridæ. As I suppose very little, if anything, is known about the representatives of this group from that country, I presume every little contribution to the knowledge must be of a certain interest, and I thus take the liberty of writing you this letter. I have found three species, and my friend, Dr. H. Schott, who is a specialist in this matter, has assisted me in classifying them. The first species is the small white *Lipura* inermis*, Tullberg, easily recognized as entirely wanting anal spines ("*spinæ anales*"). It was known before this from Sweden, Finland, Sumatra and California, and probably from Germany and Italy. Thus it is widely distributed, but it must, anyhow, be very interesting to have it ascertained from a place so far distant from the other ones as Florida. In that State I found it twice. Both times it was walking about on top of the water at the border of a small lake not far from Clarhana, on the Orange Belt Railroad, in Orange county.

The second species is *Anurida Tullbergi*, Schott. It is a good deal larger and blackish with a faint blackish tint. Characteristics for this species are that the "*organa postantennalia*" show not less than 24–28 small rays or corpuscles (even called "tumors" and "elevations," but I do not find those terms expressive). Till this time, strange to say, it is only recorded from Sweden and Finland. I found it at the same place and living together with *Lipura inermis*.

The third species is *Anurida maritima*, Laboulbene, with only 7–8 shorter and thicker corpuscles in the *organa postantennalia* and three of the same kind in the tip of the antennæ, which Dr. Schott calls antennal organ. This species is already known from the Swedish West Coast, England, France and North America. I hardly think from Florida, though, till I found it on Key West. When walking along the shore, turning over stones in the water and looking for Blenniids and other fishes, I suddenly, under a piece of lime rock, not far from the hospital, found a great number of this little insect. It was high, or at least rising, tide, and they were

*I have changed this name to *Aphorura*, Lipura being preoccupied. See CAN. ENT. XXV., 1893, 313. A. D. M.

collected in a hole on the inferior side of the stone, about one foot below the surface of the water. When I turned the rock they floated on the surface of the sea. A good many of these specimens were young and not full grown.

Hoping these facts will be of some interest for you,

I have the honour to be,

Yours very respectfully,

DR. EINAR LÖNNBERG,
Docent Zoology R. University, Upsala, Sweden.

NOTES ON THE NEURATION AND RELATIONSHIPS OF PIERIDI AND ANTHOCHARIDI.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.
(Editor of the *Entomologist's Record*, Etc).

I little thought when I wrote my short note (*ante*, pp. 47-48) that the American species of *Anthocharidi* were in such a muddle as Mr. Dyar has quickly proved them to be. It will be very necessary to go much further now with the question, and I would suggest that those who have the opportunity should, during this season if possible, and next season if it be now too late, examine critically and make drawings of the eggs, larvæ and pupæ of the Anthocharids in question and publish them in the CANADIAN ENTOMOLOGIST, where they can be examined by British workers and compared with European species. Evidently, as the American species in question are widely distributed, it will want a number of willing hands.

It must be very evident to all scientific lepidopterists that however excellent a means of subdivision the neuration may present, yet it is only one character of a great many that have to be considered. The neuration I consider gives us a *prima facie* reason for certain groupings, and I have but little doubt that the other stages of the insects' life will in the main substantiate the primary groups thus obtained.

The American species of the genus *Pieris* seem to be very homogeneous and the genus fairly defined; it will have to be left to American specialists to determine the position of *Nathalis iole*. (The true members of *Pieris* have six subsegments in the larva).

The species *creusa*, *sara*, *julia*, *Morrisoni* and *stella* would appear to belong to *Euchloë*, *i. e.*, they have the neuration (*Ante*, p. 47. fig. 3.) of that genus.

The neuration of *Ausonides olympia*, *coloradensis*, *hyantis* and *creusa* is of a type differing from any British species, but falling intermediate between *Euchloë* (where 6-9* are on a stalk) and *Leucophasia* (where 6-11* are on a stalk), since Mr. Dyar describes them as having 6-10 on a stalk. It agrees, however, exactly with that of the European species *belia* which I note as follows:—"It differs from *Euchloë* in as much as that part of the cell normally between the bases of 6 and 8 (agreeing with my nomenclature, p. 47), is contracted to a point, and consequently 6 starts almost from base of 8; 10 also starts beyond the cell." It would appear, therefore, that this group of American Anthocharids will fall in generically with *belia*. The neuration of *belia* may be figured thus (Fig. 17):

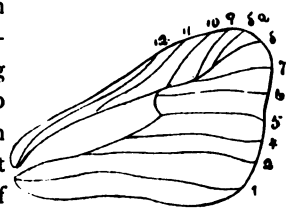

Fig. 17.
*Nomenclature following that used by Mr. Dyar.

It is evident that the primitive lepidopterous pupa was one which had a considerable amount of free movement. Dr. Chapman, whose excellent work on this subject should be read by all lepidopterists (*Vide Trans. Ent. Soc., Lon.*, 1893, *Ent. Record*, 1894, p. 25), has come to the conclusion that those pupæ which are the most solidified and have the fewest number of moveable segments are characteristic of the highest developed species, so far as the term "highest" refers to the greatest amount of differentiation which has been undergone from the primitive type. In this particular it will be seen that if we take the white butterflies or *Pierinæ* and consider the groups *Pieridi* and *Anthocharidi* the latter are much more specialised than the former, for, whilst most of the pupæ of the Pieridi have two moveable abdominal segments (5 & 6), when we examine *Euchloë cardamines* and *Leucophasia sinapis* we find the movement entirely gone and the pupa solid.

It is also worthy of note that this development of the pupa on which Dr. Chapman relies so strongly is accompanied in these two groups, so far as I have been able to learn, by an increased complexity of neuration, caused, if I may say so, by a gradual atrophy of the discoidal cell, and so gradual and continuous are the proofs of these developments that there seems no real reason for the separation of the two groups which appear to form a true and comprehensive whole.

The simplest form of neuration we get in our British species of white

Fig. 18.

butterflies is that of *Aporia* which runs as shewn in Fig. 18.

Pieris is also a very simple type of neuration (vide *ante*, p. 47, Fig. 2) where 9 is absent and a nervure, which I prefer to call 8a, takes its place at apex.

The next step forward is to *Euchloë* (ante, p. 47, Fig. 3), where nervure 8a of *Pieris* and 9 of Aporia are both developed. This is followed by the neuration of *belia* (*vide* Fig. 17), above, where 6, 7, 8, 8a, 9 and 10 all come from one stalk, 11 only coming from the top of the cell. The highest point of development in this direction is reached in *Leucophasia*, Fig. 19.

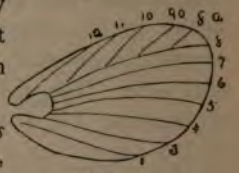

Fig. 19.

I have also examined the exotic species, *Delias eucharis*, which comes nearest to *Aporia* (Fig. 18), but lacks 10; and *Teracolus danæ*, which comes very near *Aporia*, 7 coming, however, from apex of cell with 8.

It is very evident that there is plenty to do in these groups before we can suppose we know anything about their real relationships, and that even in the light of our present knowledge our generic arrangement is sadly at fault. I can only hope that these off-hand observations made on a few species, when working for other results, may lead to some arrangement that does not upset the primary structural characters we everywhere meet.

It may be here not out of place to say why I prefer my own system of numbering the nervures. A completely typical butterfly may be said to possess 13 nervures (on forewing) ending on the margin of the wing. Of these, all are rarely (probably never) present, but those that are must have their representatives in the typical butterfly. No. 1, which ends at anal angle, is always present. If, now, we look at a *Papilio*, we see 2, 3 and 4 coming from the base of the cell, 5 from its lower external point. Now, I maintain that this last nervure, which is really a continuation of the lower edge of the discoidal cell, should always be called by the same number; hence, if we call it 5 in *Papilio*, we should call it 5 in every other butterfly, since it is structurally identical in all. Now, if we simply number upwards, as is done by Mr. Dyar (p. 100), we should call this nervure 4 in *Pieris*, because only two come from bottom of cell (3 being

obsolete), thus destroying the analogy evidently existing between *Papilio* and *Pieris*. As, therefore, (so far as I know), no butterfly has more than 12 nervures, and these nervures are not always analogous when numbered straight on, and since it has been customary to call the costal nervure 12 and the two nervures usually arising from the top of the cell 10 and 11, I have found it necessary to give the supplementary cell at apex of wing another name, and I call it 8a. to prevent confusion. This is all I have to offer as an excuse to those gentlemen whose susceptibilities I may have offended by my vagary. I am very sorry, but at present I cannot even promise not to offend again.

"Rayleigh Villa," Westcombe Hill, S. E., April 13th, 1894.

NEW SPECIES OF NOTHOCHRYSA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Since 1861, the date of Hagen's Synopsis, only three additional species of Chrysopidæ have been recorded from the United States—one from Florida, one from Texas and one from California. During the past summer I received a short note from Mr. A. P. Morse, of Wellesley, Mass., enclosing a few specimens of Chrysopidæ which he thought might prove new to our collection. When the specimens were studied they were found to belong to the genus *Nothochrysa* and probably new. Upon communicating this fact to him he requested me to describe the species and sent all his material, together with some other miscellaneous Chrysopidæ, among which was found another new species of *Nothochrysa*. The collection also contained specimens of *Chrysopa upsilon*, Fitch, and *Chrysopa chi*, Fitch; the latter was unknown to Dr. Hagen when he wrote his Synopsis, and is apparently rare.

The American species of *Nothochrysa* can be separated by means of the following table:—

A. Antennæ with the second segment annulated with black..... *annulata.*

A. A. Antennæ with the second segment not annulated with black.

B. Antennæ white, prothorax green, size large..... *phantasma.*

B. B. Antennæ and prothorax black, size small ..... *californica.*

Nothochrysa annulata, sp. nov.—Antennæ nearly or quite as long as the wings, basal segment white, immaculate, second segment ringed with black, remaining segments yellowish; head ferruginous, marked with black, as follows; Six dots on the vertex, one at each corner of an imagin-

ary square and one behind each eye, an O-shaped mark surrounding the base of the antennæ, broadest below, interrupted above; a spot between the antennæ, a crescent-shaped mark on the cheeks below the eyes, its anterior horn coalescing with the circle around the antennæ, and the apex of the palpi; the clypeus slighty emarginate; prothorax greenish-yellow, longer than broad, suddenly narrowed in front just before the middle, sides parallel behind the middle, a black dot at each corner and an indistinct transverse band at middle; wings hyaline, slightly annular at apex; pterostigma long, yellowish; the longitudinal veins and the veinlets yellowish white, except the following, which are black: the costal veinlets at base and apex, the radio-subcostal cross-vein near the base of the wing, the base of the veinlets between the first and second branches of radius, the base of the second branch of radius, both series of gradate veins, the base of the veinlets given off from the second branch of radius, the long cross-vein in the anal angle; in the posterior wings, the costal veinlets entirely and base of the veinlets between the first and second branches of radius; twenty-six costal veinlets before the pterostigma, fourteen or fifteen between the radius and its sector, nine in the inner gradate series, and ten in the outer gradate series; legs whitish, tarsi darker; abdomen green, hairy.

Length, 11 mm.; alar expanse, 30 mm.

Habitat—Wellesley, Mass, June.

Nothochrysa phantasma, sp. nov.—Antennæ longer than the wings, white, immaculate, basal segment strongly dilated within; head yellowish-white, immaculate; clypeus emarginate; palpi white; prothorax green, about as broad as long, narrowed in front, sides gradually widened backwards; meso–and metathorax yellowish-white, a purplish dot each side on the suture between the front and lateral lobes of the mesothorax, sometimes wanting; wings narrow, elongate, hyaline; hind wings angular at apex; pterostigna long, white, fuscous at base; the veins and veinlets green or white, except the following, which are black: the second branch of radius, the basal three or four veinlets between the first and second branches of radius, at their base, a spot surrounding the apical cross-vein between media and cubitus, and the gradate veins; in some immature specimens none of the veins are black; the veins and margin hairy; hairs short, white; twenty-six to twenty-nine costal veinlets before the pterostigma, sixteen to seventeen between the radius and its sector, eight to ten in the inner gradate series, seven to nine in the outer gradate series;

legs white, tarsi darker; abdomen green with a median dorsal yellow line; fifth dorsal segment with a large brownish spot.

Length, 13 mm.; alar expanse, 46 mm.

Habitat—West Chop, Massachusetts, July to August.

The following notes on the habits of this species are of interest:—"This beautiful little insect first attracted my attention while strolling at twilight along the silent leaf-strewn wood-roads of the Vineyard, in the immediate vicinity of West Chop. I first noticed it early in July, and it is still common in mid-August.

"It seems specially fond of oak trees and is nocturnal in habits, being rarely seen by day. When startled from its resting-place by daylight it flutters rapidly and erratically to a neighboring branch or downward to the sheltering undergrowth of huckleberry bushes, which everywhere fill the woods. Shortly after sundown, however, it awakens to activity, and may then be observed as a dimply perceptible paleness drifting silently and steadily through the twilight gloom.

"When taken in the hand, this impalpable apparition resolves itself into a ghostly little elf clad in pale-green and white, with brilliant purple eyes and gauzy wings; a veritable dryad of the woods."

Nothochrysa californica, Banks.—Antennæ shorter than the wings, wholly black; head reddish-yellow, antennal sockets surrounded with black, three black streaks above, connected with the black of antennal sockets, and a few blackish lines below antennæ; palpi black; prothorax black, with a median light stripe, broader at each end, and the extreme margin light, narrowed in front, sides gradually sloping; meso–and metathorax black; wings hyaline, round at apex; veins mostly black; costa and base of radius on fore-wing, costa and almost whole of radius on hind-wings, yellowish; pterostigma brown, throughout its entire length; sixteen or seventeen costal veinlets before the pterostigma, ten or eleven between the radius and its sector, ten in the inner gradate series, twelve in the outer gradate series; less testaceous, middle and hind femora darker, tips of tibiæ and joints of tarsi black; abdomen short, black, the posterior margin of the segments on sides narrowly yellowish.

Length, 9 mm.; alar expanse, 26 mm.

Habitat—California.

I am indebted to Mr. Nathan Banks, Sea Cliff, N. Y., for notes on this species.

REMARKS ON ZETHUS SLOSSONÆ.

BY WM. J. FOX, PHILADELPHIA, PA.

In the CANADIAN ENTOMOLOGIST for May (page 140) there appears an article by Mr. Wm. H. Patton, entitled "Zethus Aztecus in Florida," in which the author attempts to prove that *Zethus Poeyi*, *Slossonæ* and *aztecus* are the same species. As I am the authority for one of these species, it was but natural that I should make a study of the trio, in order to ascertain if Mr. Patton's assertions were correct. An examination of the material in my possession convinces me that Mr. P. is mistaken, and that his conclusions have no facts to enforce them. In my studies I have had a series of eight female and seven male specimens of *Slossonæ*, three females and one male of *Poeyi*, and a female of *aztecus*. In the first mentioned species, notwithstanding Mr. P.'s statements that the described differences are but variations, the only variations noticed in my series are that sometimes the yellow on clypeus and at apex of petiole are wanting. There is no yellow on the vertex of *Slossonæ*, while *Poeyi* (at least in the specimens before me) has always two large spots there; in general appearance *Slossonæ* is a much more robust insect than *Poeyi*, particularly the head and thorax, and the yellow markings thereon are by no means so promiscuous. Z. aztecus is quite a different insect in appearance from both the other species, and scarcely requires a comparison with them. Excluding the characters Patton regards as variations, the species differ as follows :—

POEYI.

Posterior face of metathorax smooth, velvety, not at all striated; enlargement of petiole rather finely punctured.

AZTECUS.

Abdomen black, greater part of legs black, petiole with exceedingly coarse punctures; collar above, anteriorly, with a prominent crest; second ventral, abdominal segment with large shallow punctures.

SLOSSONÆ.

Posterior face of metathorax very coarsely striated; enlargement of petiole tolerably coarsely punctured.

POEYI AND SLOSSONÆ.

Abdomen, except petiole, ferruginous, or claret brown; greater part of legs ferruginous * * * *; collar above, anteriorly, scarcely crested; second ventral segment with fine, sparse punctures.

ON OCHYRIA FERRUGATA, CL.

BY LOUIS B. PROUT, F. E. S, LONDON, N. E., ENGLAND.

I have recently been investigating the synonymy, and the natural history generally, of the two species of geometers which are frequently confused under the above name,* and as Packard was not quite clear about the matter, it seems desirable to call attention to the true position of their American representative. In Germany there has been frequent doubt whether *ferrugata*, Linn., and *spadicearia*, Bkh., were, or were not, specifically identical, and Zeller, to whom Packard owed his information concerning the European forms, came to the erroneous conclusion, though somewhat waveringly (see Stettin *Ent. Zeit.* xxxviii., p. 464), that they were forms of one and the same insect. He held that *ferrugata*, Cl., was really the *spadicearia* form, *ferrugata*, Linn. the *ferrugata* form (according to German usage), but, of course, did not touch the synonymy, believing that he dealt with but one species (Stettin *Ent. Zeit.*, xiv., 249). Now, when he sent examples to Packard, he naturally sent the form which is labelled as typical *ferrugata* in his collection (the darker, purple-banded form =*ferrugata* of Linn., H.-S., etc.). This, as Packard says, agrees entirely with the American species†, and it is this of which the black-banded form (var. *unidentaria* of Packard) is a variety (Stettin *Ent. Zeit.*, xlvi., 93).

But now, turning to England, we find that the specific distinctness of the two insects (now abundantly proved) has been less questioned, though, unfortunately, Haworth is responsible for considerable confusion of synonymy. Like Zeller, he accepted Clerck's figure (*Icones*, 6, 14) as the lighter red species (= *spadicearia*, Bkh.), but knew nothing of the name *spadicearia*, and introduced the species to British entomologists as *ferrugaria;* the other species, which is generally black-banded in England, though in America purple-banded forms seem common also, he named *unidentaria*.

In brief, *spadicearia*, Bkh. is =*ferrugaria*, Haw., Steph., Newman and perhaps =*ferrugata*, Cl., though his figure is very poor; *ferrugaria*, Linn., H.-S., Zeller, Packard, is =*unidentaria*, Haw., but its earliest name,

* Some of the results of my investigations may be seen in the *Entomologists' Record*, Vol. V., p. 111, etc., London, 1894.

† I have tested this by the material in our National Museum, and by some specimens kindly sent me by Mr. H. F. Wickham, of Iowa City.

assuming *ferrugata* to be preoccupied by the other species, is *corculata*, Hfn., *Berl. Mag.*, iv., 94.

So far as I have ascertained, *spadicearia*, Bkh., does not occur in the New World, and the following of Packard's citations must be deleted, as belonging thereto :—

Ferrugata, Cl. Ic. Ins., 6, 14, 1759 (perhaps).
Hübn., Schm. Eur., 460.
Stph., Nomencl., Br. Ins., 44, 1829.
Stph., Ill., iii., 216, 1831.
Stph., Cat. Br. Lep., 186, 1850.

Also, theoretically, the larval description from Newman's "British Moths," though practically the two larvæ are so similar that the description of one will apply to the other. Nevertheless, it will be well for American workers to bear in mind that our *ferrugata* is not identical with theirs.

PROFESSOR C. V. RILEY.

Every entomologist in North America will, we are confident, join with us in the expression of the deepest regret that Professor C. V. Riley has felt compelled, owing to the impaired state of his health, to resign his position as entomologist of the United States Department of Agriculture. The admirable work that Dr. Riley and his staff have accomplished, both in scientific and economic entomology during the many years that he was Director of the Division, is so well and widely known that it is unncessary to enter into any details here. There are few who possess in so eminent a degree as Dr. Riley scientific ability, accurate knowledge, painstaking industry and acute powers of observation; these gifts and attainments have been abundantly manifested in the immense additions that he has made to the knowledge of insect life in all its various phases, and it would be a calamity indeed if they were withdrawn from active exercise. It is gratifying, then, to learn that Dr. Riley will retain the honorary Curatorship of the Department of Insects in the U. S. National Museum, at Washington, and that he will now devote himself to some long-contemplated work of a purely scientific character. We earnestly trust that the relief from the cares and anxieties of administrative work in a Government Office will speedily restore his health and strength, and that we shall see the fruits of his labours during many a year to come.

While we deplore Dr. Riley's resignation, we cannot refrain from

expressing our gratification at the appointment of his successor. The authorities at Washington have shown their wisdom in conferring the vacant office upon Mr. L. O. Howard, who has been so long and so ably sharing in its duties as First Assistant. The Department is certainly to be congratulated upon having at hand a skilled and learned entomologist, who possesses in every respect the varied qualifications necessary for the successful performance of so important an office. We have every confidence that the world-wide reputation now possessed by the Division of Entomology at Washington, will be in nowise impaired under the administration of Mr. Howard, and we heartily wish him health, strength and long life for the successful performance of his arduous and important duties.

NOTES.

Mr. C. H. Tyler Townsend has resigned his position as Curator of the Museum at Kingston, Jamaica, and has returned to Las Cruces, New Mexico. He begs that his correspondents will take note of his change of address.

At the recent meeting of the Royal Society of Canada, held in Ottawa (May 22-26), Mr. W. H. Harrington, President of the Entomological Society of Ontario, and the Rev. G. W. Taylor, a member of the Society, were unanimously elected Fellows. The meeting was highly successful, many of the papers read being able and valuable contributions to scientific knowledge. The Governor-General, Lord Aberdeen, was in constant attendance, and treated the members with great hospitality. The entomologists present were especially charmed to meet and welcome Mr. S. H. Scudder, who was one of the distinguished visitors from the United States.

The Popular Science News (Boston Mass.), has recently been much improved in form and matter, under the editorship of Dr. James R. Nichols. It is now filled with interesting articles, many of them illustrated, by eminent writers in different departments of science. The last two numbers contain articles by Prof. J. B. Smith, on the "Insect Parasites of Animals."

The first two parts of Mr. P. Wytsman's (79 Rue Neuve, Brussels, Belgium) reproduction of Hubner's Exotic Butterflies have been received. Each consists of ten coloured plates, without letterpress. They are very nicely executed on hand-made paper, and are evidently faithful copies both in drawing and colouring of the originals. The work will be completed in sixty parts, and will contain about 600 plates; the synonymy, nomenclature, etc., will be revised and brought down to date by Mr. W. F. Kirby, of the British Museum.

CORRESPONDENCE.

PAPILIO CRESPHONTES.

Sir,—About the 17th of August, a specimen of *Papilio cresphontes* was seen by Mr. Charles Currelley, on the southern shore of Sparrow Lake, about one hundred and ten miles north of Lake Ontario. It was a fine specimen and was flying aimlessly about over the water. I think that this is the most northerly appearance of this insect which has been recorded. CARLYLE ELLIS, Toronto.

BREPHOS INFANS MOESCHL, AT OTTAWA.

I have much pleasure in recording the capture of a nice specimen of this rare and beautiful moth, at Ottawa. It was taken by Lady Marjorie A. Hamilton-Gordon, who writes: "I caught it in a sunny glade of fir woods, behind Government House, on April 12th. It was among fir trees and stumps. I had seen one there two days before, flying high among the trees. I noticed my specimen crawling up a long stalk, with its wings closed; and then it flew away, more like a butterfly than a moth."

The Ottawa entomologists have been on the lookout for this insect for many years; but, until now, no one has succeeded in securing it. We hope that Lady Marjorie, who is an enthusiastic collector, will be equally fortunate with some of the other insects which ought to be found at Ottawa, but which have not yet been discovered here. J. FLETCHER.

CORRIGENDA.

Sir,—It is, perhaps, worth while to suggest corrections for several errors noticed in recent issues of Canadian Entomologist:—

In October number, 1892, on p. 265, lines 12 to 14 contain an inaccuracy. My observations indicated willow as a food-plant of the larva of *Colias nastes* (not *C. interior*). The record was correctly made by Mr. Fletcher in 1889 (Twentieth Annual Rept. Ent. Soc. Ont., page 7).

An error occurs in March number, 1893. On p. 87, line 20, Banff is mentioned as a Canadian habitat of *Chionobas Brucei*. The correct locality is Hector, B. C.

On p. 54, March number, 1892, Mr. W. H. Edwards mentions my having told him that Vaccinium was the food-plant of *Colias interior*. My statement requires correction. It referred to a local species, which at that time I considered as probably *Interior*, but which, with more complete material, has proved to be allied more closely to *Pelidne* and *Scudderi* than to *Interior*. THOMAS E. BEAN, Laggan, Alberta.

Mailed June 6th.

The Canadian Entomologist.

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A PRELIMINARY REVIEW OF THE NORTH AMERICAN DECTICIDÆ.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Having recently put my own collection of Decticidæ into systematic order and treated the collection of the U. S. National Museum entrusted to me by Dr. C. V. Riley in a similar manner, I have thought it would assist in obtaining better material for a future monograph if I were to publish at least a generic discrimination of the material at hand. At the same time I am able to clear up most of the synonymy of the species and assign to their proper location the various described species, very few of which (7 out of 23) will be found to have been originally placed in the genera to which they are here assigned. This is partly because it has been necessary to establish new generic categories for a large number of our species, which are very insufficiently known, having awaited a student ever since Herman's sketch of the genera of Decticidæ twenty years ago. In the course of another year I hope to make a complete study, and not only to characterize the genera more carefully, but to describe the numerous species here indicated. It is evident that in the West a considerable number of species are likely to occur additional to those now known to me, which number about fifty, divided among fifteen genera, five of which are monotypic, and only one of which is found also in the Old World. Much might be said regarding the geographical distribution of the genera, but I will reserve that for a future occasion.

TABLE FOR THE DETERMINATION OF THE GENERA OF N. A. DECTICIDÆ.

a 1. Prosternum armed with two erect spines.

b 1. Four terminal spines on the lower side of the hind femora, two smaller ones between a larger pair.

c 1. Ovipositor straight.

d 1. Prosternal spines short, obtuse..... *Engoniaspis.*

d 2. Prosternal spines long and slender, subacute ..... *Atlanticus.*

c 2. Ovipositor arcuate.

d 1. Ovipositor curved downward; a median carina on the prothorax..... *Drymadusa.*

d 2. Ovipositor curved upward; no median carina on prothorax..... *Orchesticus.*

b 2. Two terminal spines only (the outer) on lower side of hind femora..... *Tropizaspis.*

a 2. Prosternum unarmed.

b 1. Fore tibiæ spined above on both margins.

c 1. Large bulky insects; tegmina of ♂ almost completely concealed beneath the pronotum; eyes but little larger than antennal scrobes..... *Anabrus.*

c 2. Relatively small insects; exposed portion of ♂ tegmina half as large as pronotum; eyes fully twice as large as antennal scrobes..... *Cacopteris*, p. p.

b 2. Fore tibiæ spined above on outer margin only.

c 1. Fore tibiæ with several spines above on outer margin.

d 1. Fore tibiæ with three spines above on outer margin.

e 1. Legs short, the hind femora scaicely or not extending beyond abdomen; surface of pronotum granulate..... *Peranabrus.*

e 2. Legs long, the hind femora extending far beyond abdomen; surface of pronotum smooth.

f 1. Pronotum without distinct lateral carinæ, except sometimes posteriorly; a median carina rarely present and then weak.

g 1. Pronotum transversely arched as much on the posterior as on the anterior half.

h 1. Ovipositor straight..... *Cacopteris*, p. p.

h 2. Ovipositor arcuate..... *Eremopedes.*

g 2. Pronotum laterally subangulate posteriorly, and often with a slight median carinula..... *Idiostatus.*

f 2. Pronotum with distinct lateral and median carinæ, the latter sometimes weak.

g 1. Lateral carinæ of pronotum parallel or subparallel..... *Steiroxys.*

g 2. Lateral carinæ approximated in middle of anterior half of pronotum, so as to narrow the dorsum by nearly one-half..... *Idionotus.*

d 2. Fore tibiæ with four spines above on outer margin.

e 1. Descending lobes of pronotum declivent, the dorsum narrow..... *Clinopleura.*

e 2. Descending lobes of pronotum narrow, the dorsum broad..... *Plagiostira.*

c 2. Fore tibiæ with only one spine above on outer margin, situated at apex..... *Ateloplus.*

ENGONIASPIS, Brunner (Rév. Syst. Orth., 185).

No species of this genus has yet been described. Brunner founded it upon a species from Missouri, in his collection, which is very likely the same as that represented in the Riley collection of the U. S. National Museum by an imperfect specimen from an unknown locality.

ATLANTICUS (ἀτλαντικός) Gen. nov.

This generic name is proposed for the only species of Decticidæ (except some species of Orchesticus) that occur on the Atlantic slope of North America, and are confined to that district, or at least to the region east of the Mississippi. They resemble the European Thamnotrizon in general appearance, but have a spined prosternum. They are closely related to Engoniaspis, but the males are not apterous, the prosternal spines are well developed and the cerci are not depressed. Three species are known to me, two of them long ago described by Burmeister under the names of *Decticus dorsalis* and *D. pachymerus* (one of them, probably the latter, afterwards described by Walker as *Decticus derogatus*), and a third, which appears to be a more southern and robuster form, represented in my collection by two pairs coming from North Carolina to Florida. These species may be thus distinguished:—

Inner tooth of ♂ cerci short; lateral carinæ of pronotum sharply pronounced.

Hind femora less than twice as long as the pronotum; exposed portion of ♂ tegmina almost as ample as the pronotum..... .....*pachymerus.*

Hind femora more than twice as long as the pronotum; exposed portion of ♂ tegmina less than one-third as ample as the pronotum..... .....*dorsalis.*

Inner tooth of ♂ cerci long; lateral carinæ of pronotum not sharply pronounced.....*gibbosus.*

DRYMADUSA Stein (Berl. Ent. Zeitschr., IV., 257).

Recognized in an undescribed species in my collection, represented by a single ♀ from Oregon, in which the tegmina are very abbreviated and the ovipositor apically decurved. The genus has not before been known to occur in the New World, and appears to be the only genus of Decticidæ common to the two worlds. I have no European species with which to compare it, but from the description of the genus it seems to belong here, though the pronotum has a distinct median carina posteriorly.

ORCHESTICUS Saussure (Rev. Mag. Zool., 1859, 201).

This genus was founded upon a species from Tennessee, *O. americanus*, Sauss., unknown to me. The genus is, however, the richest in species of any of our Decticidæ, no less than six nominal species having been described, some of them (not yet carefully studied) possibly synonymous, and all, excepting the typical species, described under other generic names. These are, to give them in the order of their publication: *Anabrus haldemanii* Girard, *Anabrus minutus* and *A. stevensonii* Thomas, and *Thyreonotus cragini* and *T. scudderi* Bruner. All of these are from the Mississippi Valley and the mountain region on the west, which seem to be the home of the genus, though it occurs also sparingly on the Atlantic slope. In a preliminary arrangement of the species in the collections at hand I have separated about a dozen species.

TROPIZASPIS Brunner (Rev. Syst. Orth., 187).

To this genus belongs *Arytropteris steindachneri* Herm., from Puget Sound. The genus seems to be peculiar to the Pacific Coast, from whence half a dozen species are known to me, none but the above described, and this not heretofore referred to the present genus.

ANABRUS Haldeman (Stansb., Salt Lake, 372).

This genus was founded upon a species from Salt Lake, *A. simplex*, and the genus seems to be mainly confined to the elevated country west of the Mississippi prairies. Three other nominal species have been described, *A. purpurascens* Uhl., *A. similis* Scudd, and *A. coloradus* Thom., but whether these are all distinct or are all that exist in our collections, I have not yet endeavoured to determine. All the above, however, certainly belong to Anabrus, but three others, originally described as Anabri, belong, as noted above, to Orchesticus.

PERANABRUS, Gen. nov.

This generic name is proposed for *Thamnotrizon scabricollis* Thom., from Southern Montana, which, except for its scabrous pronotum, has much the aspect of an Anabrus. It differs from it, however, in lacking spines upon the inner margin of the fore-tibiæ above, and in its distinctly carinate pronotum. It is poorly figured by Glover in his Ill. N. A. Ent., Orth., pl. 13, fig. 6.

CACOPTERIS (κακός, πτερόν), Gen. nov.

This genus, containing half a dozen species of minor size, none of which have been described, is remarkable for the fact that the inner margin of the upper surface of the fore-tibiæ is sometimes spined and sometimes unarmed; generally individuals of the same species seem to be always either one or the other, but in at least two of them, individuals of the same species differ in this respect, the males being more frequently spined than the females; when armed, there are always three spines present. The genus is peculiar to California and Western Nevada and the southern margin of the United States as far east as the upper Rio Grande. It has somewhat the aspect of the European Antaxius.

EREMOPEDES (ἐρῆμος, πηδάω), Gen. nov.

Founded on an Arizona species, of which a single ♀ is in the U. S. National Museum. It has a very uniformly rounded, slightly compressed body, with a general resemblance to the smaller forms of Orchesticus.

IDIOSTATUS Pictet (Mém. Soc. Phys. Gen., XXX., vi. 63).

Two species of this genus have been described; a smaller, *I. hermanni* (*Steiroxys hermanni* Thos.=*Idiostatus californicus* Pict.), and a larger, *I. bilineata* (*Steiroxys bilineata* Thom.), and there is what is apparently a third species, with excessively long ovipositor, in the U. S. National Museum. All the species come from California and Oregon.

STEIROXYS Hermann (Verh. Zool.-bot. Ges. Wien, XXIV. 207).

We possess three species of this genus, two of which have been described: *S. trilineatus* (*Thamnotrizon trilineatus* Thom.), the type of the genus from Wyoming and Utah, and *S. pallidipalpus* (*Decticus pallidipalpus* Thom.), from Utah, Idaho and Nevada; and apparently a third species from Northern California, Oregon and Alberta, which may be called *S. borealis*. They may be distinguished as follows:—

Abdomen conspicuously ornamented with a median series of V-shaped black spots.....*trilineatus.*

Abdomen with no conspicuous median abdominal markings.

Hind femora very long, more than three and a-half times longer than the pronotum; dorsal field of pronotum much less than twice as long as greatest breadth.....*borealis.*

Hind femora not so long, being scarcely more than three times as long as the pronotum; dorsal field of pronotum almost twice as long as greatest breadth.....*pallidipalpus.*

IDIONOTUS (ἴδιος, νῶτος), Gen. nov.

This genus is established on a couple of undescribed species, one in the U. S. National Museum, from California, the other in my own collection, collected by Kennicott somewhere on his explorations in or going to Alaska. It closely resembles Steiroxys.

CLINOPLEURA (κλίνω, πλευρά), Gen. nov.

This name is proposed for *Steiroxys melanopleura* Scudd., and its allies. It is nearly related to the European Psorodonotus, but is abundantly distinct, with no such prolonged pronotum. The typical species comes from Southern California and Utah, and two other Californian species are in the U. S. National Museum.

PLAGIOSTIRA Scudder (Wheeler's Ann. Rep., 1876, 501).

Founded upon *P. albonotata* Scudd., from Northern New Mexico. I have what is apparently a second and larger species of uniform colouring, but in poor condition, taken on the surveys for the Northern Pacific R. R.

ATELOPLUS (ἀτελής, ὅπλον), Gen. nov.

A peculiar form, apparently nearly allied to Idiostatus and Cacopteris and closely resembling them in general appearance, but remarkable for having both margins of the upper surface of the fore-tibiæ entirely devoid of spines, except a single one at the apex on the outer side. I know of but one species, from San Diego, California, represented by a single ♀ in the U. S. National Museum.

The following alphabetical list shows the genera to which the described species are here referred, with initial bibliographical references:—

Anabrus coloradus Thom., Rep. Hayd. Surv., V., 440 (*Anabrus.*)
" haldemanii Gir., Marcy Expl. Red Riv., 259 [248], pl. 15, figs. 5–8 (*Orchesticus*).
" minutus Thom., Proc. Philad. Acad., 1870, 1875 (*Orchesticus*).
" purpurascens Uhl., Proc. Ent. Soc. Philad., II., 550 (*Anabrus*).
" similis Scudd., Hayd. Rep. Nebr., 249 (*Anabrus*).
" simplex Hald., Stansb., Expl. Utah, 372, pl. 10, fig. 4 (*Anabrus*).
" stevensonii Thom., Proc. Philad. Acad., 1870, 1875 (*Orchesticus*).

Arytropteris steindachneri Herm., Verh. Zool.-bot. Ges. Wien, XXIV., 204–205, figs. 98–102 (*Tropizaspis*).

Decticus derogatus Walk., Cat. Derm. Salt. Brit. Mus., II., 260 (*Atlanticus pachymerus*).
" dorsalis Burm., Handb. Entom., II., 713 (*Atlanticus*).
" pachymerus Burm., Handb. Entom., II., 712 (*Atlanticus*).
" pallidipalpus Thom., Fin. Rep. Hayd. Surv., V., 442 (*Steiroxys*).
" sphagnorum Walk., Cat. Derm. Salt. Brit. Mus., II., 258–259 (Not a Decticid).

Idiostatus californicus Pict., Mem. Soc. Phys. Gen., XXX., vi., 64–65, figs. 35, 35a (*Idiostatus hermanni*).

Orchesticus americanus Sauss., Rev. Mag. Zool., 1859, 201 (*Orchesticus*).

Plagiostira albonotata Scudd., Ann. Rep. Wheel. Surv., 1876, 501 (*Plagiostira*).

Steiroxys bilineata Thom., Fin. Rep. Wheel. Surv., V., 905 (*Idiostatus*).
" hermanni Thom., Fin. Rep. Wheel. Surv., V., 904, pl. 44, fig. 4 (*Idiostatus*).
" melanopleura Scudd., Ann. Rep. Wheel. Surv., 1876, 500 (*Clinopleura*).

Thamnotrizon scabricollis Thom., Fin. Rep. Hayd. Surv., V., 441 (*Peranabrus*).
" trilineatus Thom., Proc. Philad. Acad., 1870, 1876 (*Steiroxys*).

Thyreonotus cragini Brun., Bull. Washb. Lab., I., 129 (*Orchesticus*).
" scudderi Brun., Bull. Washb. Lab., I., 129–130 (*Orchesticus*).

All known North American Decticidæ are apterous or subapterous, their tegmina never extending over more than two abdominal segments or thereabouts. But many European species are fully winged, and such

forms should be looked for in America, especially in the West. To the beginner it should be added that by no means all apterous or subapterous Locustarians are Decticidæ, as witness the ubiquitous Centhophili; but Decticidæ may be distinguished from other Locustarians (to follow Brunner's latest table for their separation) by having the tarsi more or less depressed (the Stenopelmatidæ have them distinctly compressed); by the presence of foramina near the base of the anterior tibiæ (wanting in Gryllacrididæ); by having the antennæ inserted between the eyes, nearer the summit of the occiput than the upper margin of the labrum (instead of the opposite); by having the first two tarsal joints longitudinally sulcate on the sides; by having the fore-tibial foramina slit-like rather than elliptical; by the presence of an apical spine on the outer side of the fore-tibiæ above (wanting, however, in a single African genus of Decticidæ); and by the presence of a free plantula at the base of the first hind tarsal joint beneath, this last character separating them from the Locustidæ proper, where the plantula is not free.

BOTYS URTICALOIDES, N. S.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

Expanse of wings one and one-fourth inches. Length of body six-tenths of an inch. Head and antennæ black. Thorax, above black bordered with white, beneath white. Legs white. Wings white, satiny, translucent. Primaries have a slight tinge of yellow. On the costa, near the middle, are two black or dark brown blotches; below these, towards the inner margin, are two other blotches, sometimes united—the whole forming a broken, transverse band. Beyond this, near the hind margin and extending from near the inner angle for about two-thirds of the width of the wing, is a second, narrower band. Secondaries have a roseate tinge. Abdomen above black, the segments bordered with white, and the extremity tipped with white; beneath white.

Described from four specimens, taken all at one time and flying by day, in an "intervale" of Brome County, Province of Quebec.

Only one other specimen of this insect has, as far as I can learn, been taken. It was discovered by Mr. Ashmead and Mr. Linell amongst unnamed material in the National Museum at Washington, D. C.

DESCRIPTIONS OF THE LARVÆ OF CERTAIN TENTHREDINIDÆ.

BY HARRISON G. DYAR, NEW YORK.

Blennocampa bipartita, Cresson.

A single fly, bred from a larva on oak at Boston, Mass., appears to belong to this species. The fly differs from Mr. Cresson's description in that all the tarsi are blackish; the abdomen above is largely blackish; there is no luteous tint discernible on the lateral margin of middle lobe of mesothorax; the anterior and posterior margins of the luteous stigma are blackish and the veins are nearly black. There are two black points in the upper medial cell and one in the second submarginal cell on forewings. The larva seems to closely resemble that described in the 5th report U. S. Entom. Commission, p. 206, as *Monophadnus dilutus*, Cresson, but the fly belongs to a different genus.

Larva.—Sitting flat on the young leaves of the black oak and eating holes through; solitary. Head wider than high, rounded above; smooth green; eyes black, with a blackish stripe from each to vertex, and two contiguous black spots on upper part of clypeus; width, 1.4 mm. Abdominal feet present on joints 6-11 and 13 (20 feet). Body smooth, not annulate, the subventral region folded. Colour uniform green. Two transverse rows on each segment of Y-shaped furcate processes, in a longitudinal plane, arranged as follows: Addorsal, two; subdorsal, two; substigmatal, one; subventral, two, not in line, one below the other. The anterior and posterior processes are tipped with black. Length, 12 mm.

Final stage.—The larva moulted and entered the ground. Smooth, annulated, with slightly elevated, concolorous warts instead of processes, inconspicuous. Pale greenish, concolorous; head pale testaceous; width, 1.4 mm.

The larva formed an elliptical cell in the ground, lined with a black secretion, about the first of June. The fly emerged the following April.

Emphytus canadensis, Kirby.

(The pansy saw-fly.)

7 ♀ ♀. The flies differ slightly from Provancher's description in having the fore and middle tarsi dusky toward tips, while the veins and stigma are black, rather than dark brown.

Larva.—Eating the whole leaf, curled spirally on the back; falls off when disturbed. Head rounded, normal, dull black, slightly slaty; eye

and mouth black, the sutures around clypeus pale; some short, pale hairs; width, 1.4 mm. Body of nearly equal width, slightly largest at anterior end; thoracic feet small, abdominal ones well developed, present on joints 6 to 13 (22 feet). Segments 6-annulate, rather sharply so, and about as distinct as the segmental incisures. Colour slaty black dorsally, not shining, smooth, the dorsal vessel showing darker; below the spiracles olive gray. Thoracic feet pale. On each segment, on 2nd annulet, a transverse row of minute white points, with a second one on 1st annulet stigmatally; a few less conspicuous ones on subventral ridge.

Final stage.—Head blackish above, pale below; eye in a black spot; mouth brown; antennæ and palpi pointed, minutely brown ringed; width, 1.4 mm. Body entirely dark olive-gray, rather bluish, slaty, the segments neatly 6-annulate, not shining, evenly minutely granular. Feet transparent, spiracles in paler areas. No white points or tubercles.

The larvæ do not feed in this stage, but seek for decayed or soft wood in which they bore a gallery to serve as a place for pupation.

Larvæ abundant on cultivated pansies at Plattsburg, N. Y., in September, the flies emerging the following April.

Emphytus cinctipes, Norton.

(The rare rose saw-fly.)

Eating the whole leaf and resting on the back, curled spirally, with the anal end on top. Head well rounded, flat over clypeus, pale brown, the ocellus in a round black spot; mouth blackish, not shining; a blackish longitudinal stripe on vertex of head. Width, 1.5 mm. Abdominal feet present on joints 6-12 and 13 (22 feet); thoracic feet large, visible from the dorsal aspect, spreading, but not greatly so. Rather dark green dorsally and in spots along the bases of the legs; whitish subtranslucent subventrally and ventrally and on the feet. Minute pointed, conical, white dots arranged in three transverse rows on each segment on the first, second and fourth annulets; on the first annulet, two each side subdorsally; on the second and fourth annulets, two subdorsally and two laterally and others substigmatally; but these last are very inconspicuous on the pale ground colour. Tracheæ showing by transparency as a white cord. The green colour becomes darker posteriorly and is interrupted at joint 12, showing that it is partly due to the food in the alimentary canal.

Final stage.—Head shining, slightly punctured, pale straw-yellow, with large black eye spot; width, 1.5 mm. Body smooth, 6-annulate, without any tubercles, coloured as before, but paler. Dorsal colour bluish-

green, especially on joint 2. A little later the black shade reappears on the vertex of head, and the dorsal colour of the body becomes dark green. The larvæ do not feed in this stage, but enter the ground and form a cell lined imperfectly and with fragile walls.

Larvæ on cultivated rose bushes at Boston, Mass., in June, the flies emerging in July.

Nematus monochroma, Norton.

6 ♂♂, 4 ♀♀. The ♀ differs from Norton's description only in having the antennæ black, including the two basal joints, and the tarsi dusky. It differs from the descriptions of *N. ocreatus*, Harrington, and of *N. mellinus*, Cresson, in having no black marks on the thorax or abdomen. The metathorax and basal plates are marked with dark brown. The ♂ is like the ♀ below, but above it is largely black. A black patch covers the whole top of the head behind the antennæ, except a narrow border to the eyes. Thorax above shining black; tegulæ and posterior angles of prothorax pale. Abdomen black above, except at the extreme tip. In other specimens the black is more extensive, staining the sides below the insertion of the wings and the whole tip of abdomen.

Larva.—Gregarious, holding to the edge of a leaf by the thoracic feet. Head smooth, shining black, a little paler around the mouth or else entirely pale testaceous, with the eye black; width, 1.3 mm. Body green, slightly shining, annulate; abdominal feet present on joints 6-11 and 13 (20 feet), but very small on joint 13. Two transverse rows per segment of elevated black spots, minute on the back, confused laterally and larger, especially two subventral ones. Spots obsolete posteriorly. Colour leaf-green, darker along the back, joint 12 tinged with yellowish. Thoracic feet greenish or tinged with black at base.

Final stage.—Differs in lacking the black spots. The larvæ enter the ground and form neat, dark brown, elliptical cocoons; that of the ♀ larger than that of the ♂.

Larvæ on poplar at Boston, Mass., in June. The flies emerged the following April.

Nematus salicis-odoratus, n. sp.

(The scented willow saw-fly.)

1 ♂, 4 ♀♀. ♀ Length, 5.5 mm. Antennæ 4 mm. long, black, third joint a little shorter than fourth. Head pale testaceous, tips of mandibles blackish brown; a large black spot covering ocelli and reaching nearly to base of antennæ, continued backward more narrowly to the

occiput. Body pale testaceous, with a faint brownish shade; thorax above, except the posterior angles and tegulæ, black, the sutures marked by pale lines; abdomen with a broad black stripe above, not reaching quite to the sides nor to the tip; end of ovipositor sheaths black. Legs concolorous with body, the tips of posterior tibiæ and their tarsi blackish; tarsi of two anterior pair of legs slightly dusky at the tips of the joints. Wings hyaline, nervures black, stigma dull luteous or partly blackish. A black point in the outer half of second submarginal cell.

♂ Length, 4 mm. The black patch on the head has a slight lateral projection, nearly touching the border of the eye; there is a black line on the pleura just below the wings and the venter is shaded with blackish brown on prothorax and mesothorax. Otherwise as in the ♀.

Belongs to the group represented by the species *sumptus*, *pleuricus*, *ribesii*, *lateralis*, *desmodioides*, *fulvipes*, *agilis*, *pallifrons*, *nevadensis* and *trifurcatus*, but does not seem to be identical with any of them.

Eggs.—Laid in masses on the under side of a leaf, on the surface without any saw-cuts. The dried, empty skins measure .8 x .4 mm.

First larval stage.—Head .3 mm. wide, rounded, shining black as in the next stage.

Second stage.—Larvæ eating holes in the leaf, near the eggs. Head rounded, full at vertex, black; width, .5 mm. Body held S-shaped; thoracic feet blackish. Segments annulate shining greenish yellow, pale; the two rows of subventral tubercles visible, smoky; none seen dorsally. Anal plate small, black.

Third stage.—Head as before; width, .7 mm.; anal plate and spines black. Lateral and subventral tubercles blackish; subdorsal black spots faintly indicated. Body light green; joints 2, 12 and 13 posteriorly yellowish. Upon approaching a group of these larvæ upon a tree, their peculiar odour is very obvious.

Fourth stage.—As in the next stage, except that the black markings are smaller. Width of head, 1.0 mm.

Fifth stage.—Head well rounded; clypeus large, quadrate, smooth, shining black, the sutures and antennæ honey-yellow; width, 1.4 mm. Body normal for Nematus, terminal segments somewhat swollen. Thoracic feet large, abdominal ones present on joints 6-11 and 13 (20 feet), the last pair small. Five medioventral eversible pale yellow scent glands behind the feet on joints 6-10. These function in the normal position of defense of the larvæ when the abdomen is held up in an S-shape. A

black anal plate with pair of terminal spines. Segments 4-5 annulate, smooth, slightly shining, the tubercles obsolete dorsally, but represented laterally and subventrally by large, smooth, rounded, shining black prominences, largest subventrally. A dorsal and subdorsal row of round black spots with irregular edges, four on each segment in a straight, even line, not shining like the subventral tubercles. Body light green; joints 2, 12 and 13 posteriorly orange. Venter orange-tinted. Thoracic feet black, except at the joints; abdominal ones green.

Larvæ entered the earth without moulting and formed thin, elliptical black cocoons of uniform close texture. Size, 6 to 7 x 2.5 to 4 mm.

Larvæ at Wood's Holl, Mass., in July and August.

FURTHER NOTES ON SCALE INSECTS (COCCIDÆ).

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEX.

The numbering of these notes is continued from p. 132.

(9.) *Chionaspis ortholobis*, Comst. In the middle of March Prof. Bruner sent me a *Chionaspis*, which he said was common on cottonwood in Nebraska, being also occasionally found on the white willow. It appeared to me to be a new species, and I was about to name it after its discoverer, but Mr. L. O. Howard, to whom I had sent specimens, delared it was *ortholobis*. This I could hardly believe, as both ♂ and ♀ scales disagreed with Comstock's description of *C. ortholobis*, so I wrote disputing the point, and enclosing further specimens. In due time came a letter stating that both Mr. Howard and Mr. Pergande had taken great trouble to examine numerous specimens and compare them with Comstock's types, and that the identity was practically certain.

The fact, therefore, appears that the original description was inadequate and somewhat inaccurate or misleading, so to save others from the mistake I came so near making, I append details of the Nebraska specimens.

♀ Scale snow-white, broadly mytiliform, slightly convex, straight or somewhat curved, tapering anteriorly; exuviæ yellowish-white, inconspicuous. Removed from the bark, the scale leaves a white mark, the so-called ventral scale. (Compared with English *C. salicis* received from Mr. Newstead, our species is quite different; the scales of *salicis* are smaller and broader, and not so white, and they have conspicuous orange or orange-brown exuviæ. *C. salicis* from Rouen, France, received from Mr. Morgan, is the same as the English form.)

♀ as described by Comstock. The lobes retain their brown colour after the rest of the ♀ has become colourless from soda treatment and compression. Rows of gland-orifices indicate obsolete segmentation of terminal portion. Ventral glands in five groups, each of about 22. Mouth-parts very near anterior border.

Eggs dark purple, found with ♀ in March. The ♀, however, is dark brown, not dark purple.

♂ Scale distinctly unicarinate. Comstock laid great stress on the keel-less ♂ scale of *ortholobis*, but my specimens show that it has normally a distinct keel. As Mr. Howard remarks, one can find individuals not showing any keel, and it so happened that Comstock's types were of this kind.

Although my supposed new species was thus set aside, Mr. Howard tells me that he knows of an undescribed *Chionaspis* on Cottonwood.

(10.) *Mytilaspis albus* var. *concolor*, Ckll., common on *Atriplex canescens* at Las Cruces, N. M. On March 19, the males, hitherto undescribed, were hatching.

♂ with the body dark purple, legs very pale yellowish, wings white. Thorax long, wings set far back. Caudal style long. Last joint of antenna shorter than those before it. Tarsus with long knobbed hairs, claw with small knobbed digitules.

(11.) *Aspidiotus abietis* (Schrank), Löw, 1882.

n. syn. *A. abietis*, Comstock.

n. syn. *A. pini*, Comstock, fide Pergande.

Lately Mr. K. Sulc wrote me that the *Coccus abietis* of Schrank was now known to be an *Aspidiotus*; therefore, he remarked, Comstock's *A. abietis* could not be retained, at all events under that name. He was not able to say whether *abietis*, Comst., was the same as Schrank's insect, but in order that I might determine this point, he was so good as to send me examples of *abietis*, Schr., which had been found on *Pinus silvestris* at Chuchle, near Prague, Bohemia.

It happened that I possessed examples of *A. abietis*, Comst., sent from Ithaca, N. Y., by Mr. R. H. Pettit; found on *Abies canadensis*. On comparing these with those from Europe, I was certain that I had only one species before me. Among the Bohemian examples, I found a ♂; it was bright yellow, with a dark brown thoracic band

Being much interested in this discovery, I hastened to communicate it to Messrs. Riley and Howard, at Washington, at the same time sending some of the Bohemian material. A reply came, that Mr. Pergande had examined my specimens and also Comstock's types, the result being that my opinion as to the identity was fully confirmed, and *A. pini*, Comst., was also added to the synonymy! Mr. Pergande's report was enclosed, and it is so interesting that I will take the liberty of reproducing it here:—

"Examined *A. abietis*, Schr., from Bohemia, and compared it with specimens of Comstock's types of *abietis*, and found that both are absolutely alike. Comstock's description of *abietis* agrees with the characters of the immature female, in which there are no groups of spinnerets; while in the mature female there are plainly five groups of spinnerets, exactly as in the European form.

"Among the specimens of Comstock's types of *A. abietis* I came across one specimen, unlike the rest, with but the two anterior groups of spinnerets present; and found it, after comparing it with the description of his *Asp. pini*, to agree with that species in every particular.

"I prepared specimens of his typical *Asp. pini* and compared them also with Comstock's and the European *A. abietis*, and found that all three of them agree perfectly in every respect.

"Those described by Comstock under the name of *A. pini*, are nothing else than a younger stage of *abietis*."

(12.) *Aspidiotus ancylus*, Putnam. Prof. L. Bruner lately sent me examples of an *Aspidiotus*, which occurs commonly in the City of Lincoln, Nebraska, only on the soft maple. These I found to agree with *A. ancylus*, except for the fact that I could by no means see the grouped glands of that species. Therefore, using Comstock's synopsis (Cornell Report, 1883, p. 56), they would have to be referred to *perniciosus*;—although they were not quite like any *perniciosus* I had ever seen, and the circumstances under which they were found were against such a reference.

I then sent specimens to the Dept. Agriculture, remarking on this anomaly, but stating that I believed they must certainly be some form of *ancylus*. Mr. Pergande again gave assistance, and found that the lack of grouped glands, as in *A. abietis*, was simply a sign of immaturity; this he practically demonstrated by discovering among the material I sent some mature females, which presented the five groups of glands, exactly as in typical *ancylus*.

ON CHIONOBAS ALBERTA, ELWES.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Mr. Wolley Dod has recently sent me from Calgary quite a number of specimens of this form, and I consider it a valid species. The description, however, of *Alberta* (♂) is quite inadequate. There is great variation in expanse of wing, and in colour. Some examples are dark brown, some are yellow-white, like the pale *N. Ridingsii*; some are decidedly fulvous, like *Varuna*. Of 13 ♂ ♂, all have one ocellus on fore-wing, and four have two; none have three. Five have one small blind ocellus on hind wings; the rest none at all. In a few the wings are thin, but not so as to permit the ink on the labels to show through, while the larger number are as opaque as in *Varuna*; in the thinner ones the mesial band shows above, defined on both edges; in the others it shows obscurely, and often the inner edge of the band is lost in the dark hue of the base. On the under side the general form of the mesial band of hind wings is circular exteriorly, and in most cases the band is broad; but in other cases it is narrow; the exterior edge is sometimes pretty even, a little erose; in others distinctly crenated, the crenations not prominent; in other cases there is a rounded prominence opposite the cell, closely like *Varuna*. In the larger part of the examples the circular or angular outline is broken near costal margin by a slight sinus. On the inner side the band has a rounded or angular sinus, the deepest part of which falls on median. The largest female expands 1.6 inch., and there is the same sort of variation in colour as in the males. One has no ocellus on fore-wing; one has one; three have two, and four have three; two have no ocellus on hind wing, and all the rest (7) have one each. In both sexes the fore-wing beneath presents a more or less complete band running with the band of hind wings. There is nothing of this in *Varuna*. Mr. Dod sent a large number of eggs, which he obtained by confining the females over grass, though, he says, they laid on everything except the grass.

He also sent me twenty-five true *Varuna*, ♂ ♀. The *Alberta* are labelled as taken from May 12th to May 23rd; the *Varuna* from May 20th to May 29th.

P. S.—I am able to add that Mrs. Peart reports that the eggs of *Alberta* are ribbed like *Brucei*, and not at all like *Uhleri*, which differs from all the Chionobas eggs we have seen. Probably *Varuna* will be found to have ribs of the same type as *Uhleri*.

CANADIAN HYMENOPTERA—No. 4.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

My last paper dealt chiefly with Ottawa sawflies, and in the present article I venture to describe a few Western species which have been for some time in my collection, and which seen to be unnamed. Synoptic tables are added as an aid to collectors of these insects.

MONOPHADNUS ATRATUS, *n. sp.*

Male—Length, 6 mm.; black, polished; head wider than thorax, eyes prominent; antennæ short and stout, third joint nearly twice as long as fourth, four to nine sub-equal. Apex of femora and remainder of legs pale. Wings slightly infumated, marginal cross-nervure straight, received in third submarginal cell beyond the middle, second recurrent nervure received about one-fourth from base of same cell, an opaque dot in second.

Described from one specimen received from the Rev. G. W. Taylor, Victoria, Vancouver Island. Allied to *M. nigrellus*, Cress., but in that species the third and fourth joints of antennæ are about equal in length, and the marginal cross-nervure coincides with the apical nervure of third submarginal cell.

The following table may aid in separating some of the species of this genus, but the descriptions of many of the black forms do not give any characters sufficiently distinctive to make the determination of specimens satisfactory. Probably a critical comparison of the types would reduce the number.

MONOPHADNUS, Hartig.

1	(5)	Ochraceous or luteous.
2	(3)	Head castaneous, also pleura and mesothorax... *dilutus*, Cress.
3	(4)	Head black, mouth-parts pale..... *marginicollis*, Nort.
4	(2)	Head black, mouth-parts and orbits pale..... *Rileyi*, Cress.
5	(8)	Dull rufous or chestnut (and black).
6	(7)	Segments of abdomen darker at apex..... *inæquidens*, Nort.
7	(6)	Segments of abdomen with pale line at apex.. *lineatus*, Kirby.
8	(11)	Black, thorax partly rufous.
9	(10)	Legs black..... *bardus*, Say.
10	(9)	Legs white..... *caryæ*, Nort.
11	(1)	Black, thorax black.
12	(13)	Abdomen partly rufo-testaceous.... ..... *rubi*, Harris.
		var. *hudsonicus*, Kirby.

13 (12) Abdomen black.
14 (21) Tegulæ and collar black.
15 (16) Legs black.....*scelestus*, Cress.
16 (15) Legs partly white.
17 (18) Third joint of antennæ much longer than fourth..*atratus*, n. sp.
18 (17) Third joint of antennæ about equal to fourth.
19 (20) Wings pale fuliginous, irridescent.....*nigrellus*, Cress.
20 (19) Wings hyaline, faintly clouded at base..... ♀ *tiliæ*, Nort.
21 (14) Tegulæ and collar pale.
22 (27) Larger species, length about .25 inch.
23 (24) Legs below trochanters reddish white, base of femora darker..... .....*medius*, Nort.
24 (25) Knees, anterior tibiæ above, and base more or less of the two posterior pair white.....*irrogatus*, Cress.
25 (26) Knees, tibiæ, except tips, and four anterior tarsi except apex, white.....*atracornus*, MacG.
26 (23) Knees, tibiæ, except tips of posterior, and four anterior tarsi, white.. .... ♂ *tiliæ*, Nort.
27 (22) Smaller species, length .18 inch; knees, tibiæ and base of tarsi white.....*parcus*, Cress.

TENTHREDO MELANOSOMA, *n. sp.*

Female—Length, 12 mm.; black, mouth-parts and anterior legs touched with white. Head large, front deeply channeled at each side of ocelli, and slightly roughened, face below antennæ polished; antennæ rather slender, third joint one-quarter longer than fourth (terminal five joints are wanting); clypeus emarginate, with a quadrangular white spot on each side, labrum, base of mandibles and palpi also white. Thorax opaque, without distinct punctuation; anterior legs with a line on apex of femora, a line on the tibiæ, and the tarsi largely, yellowish-white; a yellowish-white line also on intermediate tibiæ within; intermediate tarsi and apical joint of posterior piceous; wings hyaline, slightly infumated beyond middle; abdomen entirely black.

Described from one specimen received from Mr. Wickham, taken by him at Fort Wrangel, Alaska. It seems to be quite distinct from any of the described American species.

TENTHREDO NIGRISOMA, *n. sp.*

Female—Length, 13-14 mm.; black with pale legs; head very large, wider than thorax; frontal ridges well marked, antennæ slender; dot at inner summit of eye, clypeus, labrum and base of mandibles yellow, palpi rufo-testaceous or yellowish. Thorax opaque, roughened, especially the scutellum; a yellow spot above posterior coxæ; legs, except coxæ and dots on trochanters, entirely rufous in one specimen, and much paler in the other which has the anterior pair, the middle femora and the posterior tibiæ almost yellow; wings yellowish-hyaline, stigma and nervures black, except basal half of costa, which is rufous. Abdomen wide, flattened, shining, entirely black.

Described from two specimens from Victoria, V. I., received from Mr. Taylor (dated 5th June, 1888) and Mr. Wickham. Closely allied to *T. nigricostata*, Prov., of which the type is in my possession, but is larger, the sculpture of the scutellum is coarser, the clypeus and labrum are yellow, the costa is in part rufous, and the posterior tarsi are unicolorous with legs.

TENTHREDO RUFICOLLIS, *n. sp.*

Female—Length, 13 mm.; black, with red legs. Head not nearly so large as in preceding species, and the frontal grooves very shallow; antennæ rather short and stout; clypeus, labrum and mandibles yellow, palpi testaceous. Thorax uniformly, not coarsely, roughened; tegulæ and a large quadrangular spot on collar bright rufous; legs, except coxæ, rufous, the anterior pair a little paler; wings hyaline, nervures piceous, stigma and costa paler. Abdomen long, narrow, shining, entirely black.

Described from one specimen received (through Mr. Fletcher) from Mr. Bean and captured at Laggan, in the Rocky Mts., B. C.

The described American species of Tenthredo are now so numerous (over eighty) that it necessitates a great deal of labour to go over all the descriptions. The males in some groups, such as *signata*, etc, are so variable and resemble each other so greatly that they cannot in many instances be satisfactorily separated by the present descriptions. The three species which I have described have the abdomen entirely black, and to assist in determining them I have prepared the following table of the species having the abdomen black, and which seem to be twenty-one in number. A table of the remaining species would be very desirable.

TENTHREDO, Linn. (species with black abdomen.)

1 (6) Antennæ black with apical joints white.
2 (5) Four anterior tibiæ and tarsi testaceous.
3 (4) Collar yellow..... *antennata*, Kirby.
4 (3) Collar black..... *nigricollis*, Kirby.
5 (2) Four anterior tibiæ and tarsi black and white.... *grandis*, Nort.
6 (1) Antennæ wholly black.
7 (8) Wings violaceous, paler at apex..... ...*nimbipennis*, Nort.
8 (9) Wings fuliginous, darker at apex..... *fumipennis*, Nort.
9 (7) Wings hyaline or subhyaline.
10 (18) Legs black, varied with white or yellow
11 (12) Head above antennæ more or less yellow..... *lobata*, Nort.
12 (11) Head above antennæ black.
13 (16) Posterior tibiæ black.
14 (15) Tegulæ and edges of collar straw-white.... *flavomarginis*, Nort.
15 (14) Tegulæ and collar black..... *melanosoma*, n. sp.
16 (17) Posterior tibiæ with white annulus, wings hyaline. *decorata*, Prov.
17 (13) Posterior tibiæ yellow except tip, wings yellowish hyaline..... *cinctitibiis*, Nort.
18 (10) Legs rufous, varied more or less with black or yellow.
19 (20) Pectus rufous..... *rufopectus*, Nort.
20 (19) Pectus black.
21 (22) Coxæ red..... *rufipes*, Say.
22 (23) Coxæ waxen yellow..... *setes*, Kirby.
23 (21) Coxæ black, in whole or in part.
24 (25) Scutellum yellow..... *cogitans*, Prov.
25 (24) Scutellum black.
26 (35) Labrum and clypeus (in part) yellow.
27 (28) Femora black, except tip of anterior..... *concessa*, Nort.
28 (29) Femora black at base only..... *atrocærulea*, Prov.
29 (27) Femora largely red or testaceous.
30 (31) Posterior legs black, except apical joint of tarsi..... *uniformis*, Kirby.
31 (32) Posterior tarsi and tip of tibiæ black or piceous..... *erythromera*, Prov.
32 (30) Legs rufous, except coxæ.
33 (34) Tegulæ and collar black..... *nigrisoma*, n. sp.
34 (33) Tegulæ and edges of collar rufous..... *ruficollis*, n. sp.
35 (26) Labrum and clypeus black ..... *nigricostata*, Prov.

THE COLEOPTERA OF CANADA.

II. The Scarabaeidæ of Ontario and Quebec.

BY H. F. WICKHAM, IOWA CITY, IOWA.

The beetles of this family are more characteristic of Southern latitudes than of cold climes like Canada; of about six hundred species known from America, north of Mexico, only ninety-six are recorded from the Provinces which form the subject of the present paper. From all other families they may at once be known by the antennæ, terminating in a club composed of lamellæ or plates, which are capable of close opposition or of separation at the will of the insect. The antennæ of the Lucanidæ somewhat resemble them, but the leaves (or rather plates) are not capable of being closely brought together. The only insect in this country which would be likely to cause a doubt to arise in the mind of anyone is *Nicagus*, described below, in which the lamellæ are not quite approximated on their faces, but the form is decidedly not that of a Lucanid, and no serious trouble would follow its study. The legs of all the Scarabaeidæ are fossorial, often very highly so.

The larvæ are elongate fleshy grubs (fig 20, 2, larva of *Lachnosterna*), usually whitish in colour, with a black or brown head; the segments of the body are transversely wrinkled and the tip of the abdomen bent under, so that when taken from the ground the larva lies on its side. In motions they are slow, in feeding habits diverse—those of the Laparosticti or Coprophaga living in dung or other refuse matter, such as old skins and feathers, thus rendering man much valuable aid as scavengers, by removing from sight and smell a great deal of filth. The larvæ of the Melolonthini feed on roots of living plants, and often do vast damage, while those of the Pleurosticti eat various substances—some of them roots, others old dung, others rotten wood, while still others occur in the nests of ants.

Fig. 20.,

Nearly all the North American genera have been treated from time to time by Dr. Horn, and his papers may be found in the Transactions of the American Entomological Society for the past twenty years. Some of these essays are not now easily obtainable, and while the Doctor has, with his accustomed care, elaborated the characters useful in synoptic work in such a way as to leave apparently little new to be discovered, it is hoped that to many of the readers of the CANADIAN ENTOMOLOGIST the present paper, by bringing together in one easily accessible place the scattered material necessary for a study of the species of Old Canada, may not be useless nor unwelcome. The tables are based on the studies of Dr. Horn, and in one or two cases I have used his own entire in small genera, in which case due credit will be found to be given. In other instances I have been able, having a less number of species to handle, to use more evident characters, such as colour and size in the separation of species. It must be understood that these tables apply to the forms of East Canada *only*, and must not be used for the beetles of the West Coast nor of the United States generally, though many forms from the New England and other Eastern States can be identified with proper care.

It has been thought best, in order to avoid a long, complicated generic table, to treat the family in three divisions, as proposed by Dr. Leconte in the Classification. They may be distinguished structurally as follows; the notes succeeding will make the primary separation more easy to beginners :—

"I. Abdominal spiracles situated *in the membrane* connecting the dorsal and ventral corneous plates, the last one covered by the elytra ..... *Laparosticti.*

II. Abdominal spiracles in part situated on the superior portions of the ventral segments, the last one usually visible behind the elytra; the rows of spiracles feebly diverging. ..... *Melolonthinæ.*

III. Abdominal spiracles (except the anterior ones) situated in the dorsal portion of the ventral segments, forming rows which diverge strongly. Last spiracle usually visible behind the elytra... ..... *Pleurosticti.*"

Aside from the characters given above, the Laparosticti or Coprophaga may be ordinarily known by the possession of the following characters: Form compact, though sometimes moderately elongate; legs usually highly fossorial, claws simple, suture separating clypeus from front of head not transverse, but extending up towards the vertex. The males are often armed with horns or tubercles on the head and thorax. In the absence

of other more technical knowledge, their dung-eating habits will separate most of them from the other sub-families. The Melolonthinæ (of which the "June-bugs" are good examples) are usually of looser, more slender build, the legs especially being elongate and the tarsi sometimes very slender. The clypeal suture is transverse, not extending up on the head, and the club of the antennæ is often elongated in the males. They are entirely vegetable feeders, and occur on leaves and flowers, or flying in the evening—never in dung. The Pleurosticti have mostly very similar habits in the beetle state, though *Ligyrus*, which somewhat resembles a *Lachnosterna* in form, but with stouter legs and shorter tarsi, is found under old dung-heaps (not in fresh manure), and *Cremastochilus* occurs in ants' nests. They are ordinarily heavily-built insects, though not always so, and in lack of knowledge of the characters presented by the spiracles, the beginner must rely chiefly on the specific descriptions for classifying his specimens, since I am unable to give other means for distinguishing them as a group, though readily placed properly by anyone who has any acquaintance with the family.

The generic key to the Coprophaga, which follows, is primarily based on the "Classification," though for minor divisions I have not scrupled to use such characters as colour and size—the main object being, of course, the easier identification of their specimens by beginners and others who have not access to libraries, either public or private. Their further study may easily be prosecuted, by those who wish it, at the expense of purchase of the works mentioned above.

TABLE OF GENERA OF COPROPHAGA.

A. Abdomen with six visible ventral segments.
  b. Antennæ with 8 to 10 joints. Mandibles concealed by clypeus except in *Ægialia*.
    c. Hind tibiæ with a single terminal spur (except in Canthon nigricornis), form shorter, rounded.
      d. Middle and hind tibiæ slender, but little expanded at tip. Head and thorax never horned in either sex..... *Canthon.*
      dd. Middle and hind tibiæ much expanded at tip, horns often present.
        e. Larger species (.32 to 1.10 in.), no onychium.
          Colour black..... *Copris.*
          Colours metallic and green..... *Phanæus.*

ee. Smaller species, .14 to .34 in. Onychium present..... *Onthophagus.*

cc. Hind tibiæ with two spurs. Species oblong-convex or subcylindrical, usually small.

f. Mandibles visible beyond the clypeus..... *Ægialia.*

ff. Mandibles not visible beyond the clypeus.

g. First five striæ of elytra reaching apical margin (in the Canadian species)..... *Pleurophorus.*

gg. First five striæ not reaching apical margin. Head punctured or slightly plicate.

h. Outer apical angle of hind tibiæ prolonged, spiniform ..... *Atænius.*

hh. Outer apical angle of hind tibiæ obtuse.

Front tibiæ strongly toothed on outer margin..... *Aphodius.*

Front tibiæ with outer teeth obtuse except at tip..... *Dialytes.*

bb. Antennæ 11-jointed, mandibles prominent, visible from above; form often very convex, rounded.

i. Club of antennæ very large, lenticular. Brown or spotted species.

Eyes partially divided by sides of head. Males with short flattened horn..... *Bolboceras.*

Eyes entirely divided. Males with long slender horn..... *Odontæus.*

ii. Club of antennæ looser, more flattened. Black bluish or greenish species..... *Geotrupes.*

AA. Abdomen with five visible ventral segments.

Tarsi with distinct bisetose onychium. Thorax strongly narrowed before and behind, angulate at middle. Sculpture not very rough..... *Nicagus.*

Tarsi with distinct claws, no onychium. Thorax less narrowed anteriorly, not angulate at middle. Sculpture very rough *Trox.*

CANTHON, Hoffm.

The Canadian species are black or slightly bronzed insects which may be seen rolling balls of excrement from place to place. These ball[s] buried and the eggs deposited therein, thus ensuring the larvæ a s[upply] of food. They may easily be distinguished from the three follo[wing]

genera by the much more slender middle and hind tibiæ, which, though very slightly expanded at the tip, are not triangularly dilated. The clypeus has prominent teeth at middle. They may be separated as follows:—

A. Small species, .25 to .35 in., clypeus 6-dentate, hind tibiæ with two spurs..... *nigricornis*, Say.

AA. Larger species, .40 to .76 in., clypeus bidentate, hind tibiæ with one spur.

Prothorax distinctly granulate..... *lævis*, Drury.

Prothorax without raised granules, simply scabrous..... *chalcites*, Hald.

Fig. 21.

Fig. 21 represents *Canthon lævis*.

COPRIS, Geoff.

The species of this genus do not transport excrement in balls, but bury it in burrows on the spot. The males have the head or thorax or both variously tuberculate or horned, as in *Onthophagus*, from which they differ by the larger size and the absence of bristle-tipped onychium between the claws. The table gives the chief points of difference:

A. Elytra with eight striæ, front of head semicircular.

Clypeus evenly and densely punctured all around. Size large, .52 to .70 in..... *anaglypticus*, Say.

Clypeus densely punctured at sides, nearly smooth at middle. Size small, .32 to .44 in..... *minutus*, Dru.

AA. Elytra with seven striæ, front of head parabolic. Length, .80 to 1.10 in..... *Carolina*, Linn.

Fig. 22.

Fig. 22 represents *C. anaglypticus*, and fig. 23, *C. carolina*.

PHANÆUS, MacLeay.

The single species reported in the Canadian lists is a beautiful green insect, with the thorax usually coppery-red, the head, in the male, with a long horn. The length varies from .48 to .88 in. It is *P. carnifex*, Linn. The habits are the same as in *Copris*.

Fig. 23.

ONTHOPHAGUS, Latr.

Three species are known from Canada. They are found in dung, under which they burrow in the same manner as *Copris*. They are thus distinguished:

A. Larger species (.16 to .34 in.). Thorax of ♂ protuberant anteriorly.
Black, not shining; carina of vertex in male simple, not produced at the extremities..... *Hecate*, Panz.
Greenish or bronzed; carina of vertex produced at the extremities into horns or acute tubercles in the ♂ *Janus*, Panz.

AA. Smaller species (.14 to .20 in.). Thorax of male without protuberance.
Black, feebly shining..... *pennsylvanicus*, Har.

Some of the specimens of *O. Janus*, in which the head of the males has merely an acute tubercle at the ends of the vertical carina, and in which the colour is a bright bronze or metallic green, have been separated under the name *Orpheus*, Panz.

ÆGIALIA, Latr.

But one species, *Æ. conferta*, Horn, has been recorded from Old Canada. It is a small insect (.14 to .18 in.), piceous-black or brown in colour, oblong-convex, somewhat broader behind. The thorax has a distinct basal marginal line; the spurs of the hind tibiæ are rather short, broadly expanded at tip, with a translucent border. Other species of this genus will no doubt occur later, but the above characters will distinguish it from any heretofore known in North America.

PLEUROPHORUS, Muls.

A single species (*P. ventralis*, Horn) has been found in Ontario. It is an elongate, parallel, subcylindrical insect, .16 in. in length, piceous black, with reddish brown legs. The first five striæ of the elytra reach the apical margin, and it may thus be distinguished from any Aphodiide in the N. A. fauna. I have seen no specimens.

ATÆNIUS, Harold.

Small, slender, black insects, somewhat resembling *Aphodius*, but ordinarily smaller and more elongate. They frequently occur on the banks of streams. The species are very difficult to separate, but may be distinguished as follows, after the table given by Dr. Horn:

A. Posterior tibiæ with accessory spinule (a prolongation of the apical margin on the under side adjacent to the spurs).

Clypeus finely punctured, not rugose..... .....*strigatus*, Say.
Clypeus coarsely punctured or wrinkled.....*cognatus*, Lec.

AA. Posterior tibiæ without accessory spinule.

Black, shining; form slender, elongate; head closely punctate, clypeus broadly and feebly emarginate, elytral intervals convex, abdomen coarsely punctate.....*gracilis*, Mels.

The specimens referred to in the Canadian lists as *A. stercorator*, F., are presumably *strigatus*, which was formerly placed as a synonym of *stercorator*. I am not aware that *cognatus* has been found in Canada, but as it is known from the adjoining regions and might easily be mixed with *strigatus*, I have included it in the table.

DIALYTES, Harold.

Small, dark-coloured insects, differing from *Aphodius* in having the teeth of the outer margin of the anterior tibiæ obsolete, except the apical one. As all the known North American species are found in Canada, I can do no better than to reproduce the table given by Dr. Horn, in his Monograph of the Aphodiini inhabiting the U. S.*

Intervals of elytra flat; clypeus not toothed.....*truncatus*, Mels.
Intervals finely carinate, striæ catenulate; clypeus with an acute tooth each side.....*Ulkei*, Horn.
Intervals strongly elevated; clypeus not toothed, thorax with deep median impression.....*striatulus*, Say.

APHODIUS, Illiger.

These are commonly found in dung, and are in fact our most numerous scavengers. Several of them, such as *A. fimetarius*, a large species with bright red elytra; *A. fossor*, a large black species, and *A. inquinatus*, which has a black thorax and variegated elytra, are well known to every collector. Some of the Aphodii are very widely distributed, those mentioned above, as well as *granarius*, our common little black species, being found in both hemispheres. None of them construct balls for transportation, but burrow in and under the dung, and the larvæ go through their transformations on the spot. I have taken pupæ and perfectly fresh imagines of *A. stercorosus* under dry dung at the end of August, in Iowa.

From *Atænius*, the genus *Aphodius* is separable by the outer apical angle of the hind tibiæ being obtuse instead of produced and spiniform.

*Trans. Amer. Ento. Soc, XIV., 1887.

This character may be tolerably easily made out with a magnifying glass of even low power, and is, at any rate, not likely to cause much trouble, as most of the species can be separated by their facies after a little experience. The Canadian species of *Atænius* are all black, the legs often a little paler, while the *Aphodii*, on the other hand, are usually more or less parti-coloured. From the other neighbouring genera of the group it is sufficiently easily distinguished by the characters given in the table.

The following synopsis is purely artificial, and some of the variable species occur in it twice, but as the object of these papers is simply to make the identification of their species easier for beginners, and not to offer new schemes of classification, it has been thought best to seize upon the most easily seen characters. Immature specimens are easily recognized, as a rule, by the softness of their integuments, and excluding these, we can use colour as a guide to many of the species. I have therefore separated them as follows :

A. Scutellum long (¼ to 1-5 the length of the suture), species large.
Anterior tibiæ serrulate above the teeth. Colour black, .40 to .44 in..... *fossor*, Linn.
Anterior tibiæ not serrulate above the teeth. Colour variable, .24 to .40 in..... *hamatus*, Say.

AA. Scutellum short (not more than ⅛ to 1-10 the length of the suture), size variable.

b. Colour above uniform black or piceous black, tip of elytra sometimes reddish.

c. Body beneath black or piceous, varying to brownish.

d. Front distinctly trituberculate.
First joint of hind tarsus not longer than next two, .16 to .25 in..... *granarius*, Linn.
First joint of hind tarsus slightly longer than next two, .18 to .22 in..... *ruricola*, Mels.
First joint of hind tarsus equal to next three, .14 to .20 in..... *vittatus*, Say., *var.*

dd. Front without tubercles.
Small species, .16 to .20 in. Elytra reddish at tip..... *terminalis*, Say.
Larger, .28 to .36 in. Elytra unicolorous..... *oblongus*, Say.

cc. Body beneath not black (abdomen, metasternum and legs pale yellow,) .18 to .24 in..... *bicolor*, Say.

bb. Colour above not uniform black nor piceous black. Variable.

e. Elytra vittate, or spotted, or both.

Large, margins of head and thorax paler, .26 to .28 in.....*leopardus*, Horn.

Smaller, head black, anterior angles or entire sides of thorax paler, .18 to .22 in.....*inquinatus*, Fabr.

Sides of thorax not paler.

Smaller (.16 to .20 in.), abdomen black. *vittatus*, Say.

Larger (.18 to .24 in.), abdomen yellow.....*bicolor*, Say, *var.*

ee. Elytra not distinctly vittate nor spotted, sometimes fuscous.

f. Thorax black or piceous, sides more or less yellow or reddish.

Elytra bright red, .26 to .34 in.....*fimetarius*, Linn.

Elytra of greasy aspect, pubescence well marked, colour almost fuscous, .18 to .26 in. *femoralis*, Say.

Elytra shining, pubescence feeble, deciduous, colour more yellow than fuscous, .22 to .30 in.....*prodromus*, Brahm.

ff. Thorax black, sides not yellowish, .28 to .30 in.....*rubripennis*, Horn.

fff. Ferruginous brown, head and thorax slightly darker, .14 to .16 in.....*lentus*, Horn.

Two of the names (*A. hyperboreus* and *A. dentiger*) which occur in the Society's List do not appear in the above table. The former is a variety of *hamatus*, with fainter striæ and flat interspaces, while the reference of a Canadian species to *dentiger*, otherwise known only from South-western Texas and Arizona, is almost certainly incorrect.

BOLBOCERAS, Kirby.

Two species are known in North America, of which only the first is reported from Canada. They may be separated thus:

Colour uniform brown, shining.....*lazarus*, Fabr.

Colour above yellow, head black, thorax more or less black at base and on disk. Elytra with suture and apex black.....*farctus*, Fabr.

Odontæus, Kl.

The males of this genus may easily be known from those of *Bolboceras* by their long slender cephalic horn. The females may be placed in their proper genus by the complete division of the eyes by the side of the head. Two species are known from Old Canada, the males of which may be separated by the following table, the characters used having been pointed out by Dr. Horn. Unfortunately, I have seen no females and am unable to give characters for their specific distinction:

Horn of head fixed, less slender.....*cornigerus*, Mels.

Horn of head moveable, more slender.....*filicornis*, Say.

Geotrupes, Latr.

The three recorded Canadian species are large insects, bronzed, greenish or purplish in colour, easily found in dung during the summer. They do not transport balls, but burrow under the mass. The members of this genus have been very thoroughly studied by Jekel, Horn and Blanchard, so that new characters for their separation can hardly be devised. After study of their tables I offer the following, essentially that of Dr. Horn:

First joint of hind tarsus shorter than next three; claws of middle tarsi chelate in ♂.....*splendidus*, Fabr.

First joint of hind tarsus equal to next three; claws of ♂ normal.

Elytral striæ with coarse crenate punctures.....*Egeriei*, Germ.

Elytral striæ with rather fine punctures.....*Blackburnii*, Fabr.

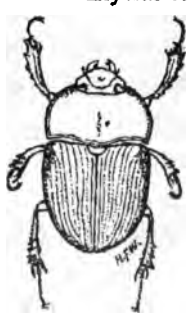

Fig. 24.

Fig. 24 shows a specimen of *G. splendidus*.

Nicagus, Lec.

The only species is *N. obscurus*, Lec., a reddish-brown or blackish-brown insect, something over a quarter of an inch in length; clothed with short, nearly white hair. The antennal club is large, but the lamellæ do not touch one another at base, though they sometimes meet at the tips. The thorax has a distinct angulation of the sides behind the middle, and is fimbriate with rather long hairs. Dr. Leconte says it has been found flying around heaps of putrid fish,—this is the only record of the habits that I have met with.

TROX, Fabr.

The species of Trox are rough, dirty-looking, brown insects, usually more or less incrusted with earthy matter, found under dry carrion and old hides or feathers. They are quite uniform in appearance and are consequently not readily separated, more particularly as they vary to some degree in sculpture within specific limits. I am entirely unable to find constant and easily recognized characters on which to make groups otherwise than those established by Dr. Horn, and the table, therefore, follows his own exactly :

A. Scutellum hastate (*i.e.*, shaped like a spear-head). Large species. Sides of prothorax near base often with feeble incision. Elytra with rows of distinct smooth tubercles. Length, .48 to .66 in. ..... *punctatus*, Germ.

AA. Scutellum oval, species smaller. Hind femora without spinules on posterior margin.

b. Tubercles of elytra with black setæ.

Tubercles elevated, setæ erect, rather long. Length, .25 to .28 in. ..... *erinaceus*. Lec.

Tubercles indistinct, setæ short. Length, .36 to .44 in. ..... *capillaris*. Say.

bb. Tubercles of elytra with pale or rufous hairs or scales.

c. Elytra distinctly tuberculate.

d. Thoracic ridges straight or nearly so.

Elytral margin serrulate or crenulate at base. Length, .24 to .32 in. ..... *sordidus*, Lec.

Elytral margin entire at base. Length, .40 to .48 in. ..... *unistriatus*, Beauv.

dd. Thoracic ridges very sinuous. Length, .20 to .24 in. ..... *terrestris*, Say.

cc. Elytral tubercles very indistinct, being replaced by patches of setæ.

Anterior tibiæ not serrulate above the lateral tooth. Length, .25 in ..... *æqualis*, Say.

Anterior tibiæ serrulate near the base. Length, .20 to .28 in. ..... *scaber*, L

CORRESPONDENCE.

OCCURRENCE OF TRIPTOGON OCCIDENTALIS IN MAITOBA.

Sir,—About four years ago a specimen of this moth came to light one evening through an open window. I saw no more until last year, when I found two large pupæ at the foot of a white poplar tree. One of them produced the perfect insect, but the other was unfortunately a failure, and only produced a number of Tachinous flies. I also caught, attracted by light, a fine female moth which laid several eggs. Unfortunately I was unable to watch them very closely, and several hatched out, and the larvæ died. I succeeded, however, in partially rearing one on the leaves of the white poplar. This is a rough description of the larva:—Colour, polar-green. Head large and square and with an inverted v mark. Yellow or gold ring between first and second, and second and third segments. Yellowish-white stripe from anal horn, which is very small, and whitish forward to the last pair of legs. This after 3rd or 4th moult. After 5th moult, the head became yellowish-white with a pinkish tinge-horn almost disappeared; the line from the horn assumed a purplish shade; slight oblique lines on each segment. Eight pink spiracles on either side. Pro-legs and claspers, pink, and above the anus a heart-shaped patch of pale bright green. Colour, whitish poplar-green, skin very rough, 2 yellow bands between first segments as before. Shortly after taking this note the larva died. From time to time I have seen a few specimens of *Macroglossa bombyliformiz*, (I use the name of the English lists as I am unable to see any difference, and in any case you will know the insect I mean), but last year it and *M. fuciformis* simply swarmed on the blossom of the wild plum and wild black currant. At the same time I took two specimens of a species of Deilephila closely allied to *D. Galii*. This is the second species of this genus that I have taken.

As Southern Manitoba may be unknown to many of your readers, a short description of my place may be of some interest. I am some 120 miles west of Emerson, and 12 miles north of the boundary line. It is intersected by a stream running in a deep ravine, the banks of which are clothed with oak, white and black poplar, elm, birch, ash-leaved maple, willows of very many species, ash, cherries, Saskatoon *Amelanchier alnifolia*, cranberry, gooseberry, currants, plum, hazel and Cratægus thorn. The prairie, too, is not the generally conceived grassy sea, but is dotted with clumps of poplar, willow, etc., and with here and there patches of *Elæagnus argentea*, in prairie parlance "wolf-willow," roses, etc. E. F. HEATH, the Hermitage, Cartwright, Manitoba.

Mailed July 6th.

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CANADIAN HYMENOPTERA—No. 5.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

This paper contains descriptions of some apparently new species of ichneumons from British Columbia. Most of these are contained in a very interesting collection made by the Rev. G. W. Taylor, during his residence at Cedar Hill, near Victoria, V. I. When Mr. Taylor left Ottawa to return to Victoria, about three years ago, he very generously handed over to me his Hymenoptera, only asking that I should publish a list of the species. To enable me to fulfil this request, I have found it necessary to first prepare descriptions of the new species.

Sub-family ICHNEUMONINÆ.

ICHNEUMON TAYLORII, n. sp.

Male—Length, 15–16 mm. Ferruginous varied with yellow. Head ferruginous on vertex, the posterior margin, a spot enclosing the ocelli and another above the antennæ, black; face, cheeks below, mandibles and palpi yellow; antennæ long and slender, black, with scape yellow. Thorax with the sutures more or less black; the mesonotum, upper margin of pleura and base of metathorax ferruginous; remainder yellow, including the scutellum; legs almost yellow, the posterior femora, apical half of tibiæ and the tarsi pale ferruginous; coxæ yellow, the middle and posterior pairs with a black spot within; wings yellowish hyaline, nervures piceous, stigma yellow, costa ferruginous. Abdomen with the basal segments varied with yellow, the terminal ones almost ferruginous; postpetiole and base of following segment aciculated, gastrocœli shallow; one specimen has a narrow black line at base of segments 3–5, the other has only a black spot on petiole beneath.

This handsome species is described from two ♀ specimens from Victoria, V. I., collected by my friend, the Rev. G. W. Taylor, F. R. S. C., after whom I have much pleasure in naming it.

ICHNEUMON OCCIDENTALIS, n. sp.

Female—Length, 11 mm. Rufo-ferruginous. Head rufous, subtuberculate beneath antennæ, face sparsely punctured; antennæ black, thickened towards apex, with a white annulus, scape rufous. Thorax mostly black; the mesonotum, scutellum and spot at base of metathorax rufous, legs entirely rufous, except apical joint of tarsi, which is brownish. Abdomen rufous; postpetiole and two following segments closely opaquely punctured, remaining segments shining; gastrocœli oblique, linear; a strong transverse depression near apex of the same segment.

Described from one ♀ specimen taken at Victoria, Vancouver Island, in Nov., 1890, by Mr. Taylor.

PLATYLABUS PACIFICUS, n. sp.

Female—Length, 9 mm. Black, with rufous abdomen and legs. Head small, closely punctured; palpi reddish, antennæ entirely black, slightly stouter beyond the middle. Thorax closely punctured, the pleuræ more coarsely; metathorax rugose, excavated behind; carinæ indistinct, angles subspinose; legs rufous, coxæ and trochanters black; wings subhyaline, stigma and nervures reddish, areolet pentagonal. Abdomen rufous, polished, except postpetiole, which is aciculated, with two dorsal carinæ not reaching the apex; ovipositor slightly exserted.

Described from one ♀ specimen from Vancouver Island (Taylor).

CENTETERUS CANADENSIS, n. sp.

Female—Length, 5 mm. Black; legs and band on abdomen rufous. Head large, vertex and cheeks polished, face punctulate; mandibles rufous, palpi pale; antennæ black, scape oval, red beneath, joints 3-5 subequal, about twice the length of the remaining joints, which are about as broad as long. Thorax black, shining, the mesonotum and pleuræ with sparse faint punctures, the metathorax distinctly areolated, the angles spiniform; legs rufous, the posterior coxæ, tibiæ at apex and tarsi piceous. Abdomen polished, first and apical segments black; two, three and base of four rufous.

Described from 3 ♀ specimens from Victoria, V. I. (Taylor.)

HERPESTOMUS FLAVICOXÆ, n. sp.

Male—Length, 6 mm.—Black, with rufous legs. Head black, front rounded, sparsely punctate; clypeus, mandibles and palpi yellow; antennæ stout, black above, piceous beneath, scape yellow. Thorax black,

mesonotum sparsely punctulate; scutellum with fine central carina; metathorax distinctly areolated, the posterior face striated; legs red, four anterior coxæ and trochanters yellow, posterior coxæ black, tipped with yellow, trochanters yellow, spotted above with black, tips of posterior tibiæ and their tarsi brownish; wings hyaline, a little dusky, stigma and nervures dark, areolet rather large, pentagonal. Abdomen black, with the incisures and lateral margins rufo-testaceous.

Described from one ♂ specimen from Victoria, V. I. (Taylor.)

Sub-family CRYPTINÆ.

CRYPTUS VANCOUVERENSIS, n. sp.

Female—Length, 11-15 mm. Black, with rufous abdomen and legs. Head transverse, not much swollen behind the eyes, closely punctured, inner orbits narrowly whitish; a rounded shining tubercle below the antennæ; clypeus swollen, shining, touched with white in one specimen; palpi blackish; antennæ long and slender, black, the scape rufous beneath. Thorax entirely black; the pleuræ and metathorax closely, almost rugosely, punctured; metathorax not distinctly areolated; mesonotum and scutellum shining, finely and sparsely punctulate; wings fuliginous with violaceous reflections; tegulæ piceous; legs, including coxæ and trochanters, bright red; terminal joint of tarsi piceous; posterior tibiæ darker toward apex, the tarsi yellowish. Abdomen entirely red, highly polished; the ovipositor as long as abdomen without petiole, red, the sheaths black.

This handsome species is described from three ♀ specimens from Victoria, V. I. (Taylor.)

CRYPTUS VICTORIENSIS, n. sp.

Female—Length, 7-9 mm. Black; abdomen and legs mostly rufous. Head subrugosely punctured beneath antennæ, closely but more finely above; inner orbits and edge of clypeus narrowly white; antennæ long, slender, black, with a short white line above on joints 9-11. Thorax coarsely punctured, but somewhat shining, scutellum polished, with few punctures; metathorax rounded, with transverse carina, but not areolated; collar, tegulæ, scutellum and posterior angles of metathorax with minute white dots; legs rufous, including coxæ, posterior tibiæ and tarsi black, the former with a pale annulus near the base, the latter with joints 2-4 white in one specimen, but partly black in the other; wings almost hyaline, areolet small, nearly quadrangular. Abdomen polished rufous;

postpetiole with scattered punctures, second segment strongly and densely punctured, third more finely, remainder polished, scarcely punctate; petiole partly and the three or four terminal segments black, the latter narrowly margined with white; ovipositor one-half as long as abdomen, sheaths black.

Described from two ♀ specimens from Victoria, V. I. (Taylor). A pretty little species resembling somewhat in coloration *C. extrematis*, Cress., but easily separated by the smaller size and the much coarser punctuation.

CRYPTUS FLAVIPES, n. sp.

Female—Length, 4 mm. Black, with yellowish legs. Head small, finely punctulate, vertex shining; spot on mandibles and palpi pale; antennæ wanting. Mesonotum polished; metathorax rounded, closely punctured, without distinct carinæ; legs, including coxæ, pale rufo-testaceous, tips of posterior tibiæ and tarsi darker; tegulæ pale, nervures brownish, stigma paler. Abdomen with first and second segments closely, finely punctulate; terminal segments with apical margins indistinctly whitish; ovipositor as long as abdomen, red, with piceous sheaths.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

CHÆRETYMMA ASHMEADII, n. sp.

Female—Length, 8 mm. Black, with red legs. Head transverse, as wide as thorax, polished, eyes prominent, front with sparse punctuation, slightly concave, with a small shallow basin above each antenna; cheeks polished, impunctate; face below antennæ finely opaquely punctured; palpi pale; antennæ wanting. Thorax entirely black, very slightly pubescent; sides of prothorax striated; mesonotum prominent, the middle lobe slightly advanced, polished with sparse fine punctures, pleuræ closely, not coarsely, punctate; scutellum polished; metathorax closely punctured, opaque; posterior transverse carina distinct, but metanotum not areolated; legs, including coxæ and trochanters, entirely red; wings rather small, slightly infumated, nervures and stigma piceous, areolet medium in size, subpentagonal, considerably higher than wide. Abdomen as long as head and thorax, black; first segment gradually expanded to tip, finely opaquely punctulate and with fine lateral carinæ; second segment as wide as long, also finely opaquely punctulate, except at apex; remaining segments polished; the ovipositor longer than abdomen, red, with black, polished sheaths.

Described from one ♀ specimen from Victoria, V. I. (Taylor), and named after Mr. W. H. Ashmead, as a slight recognition of the invaluable assistance which I have received from him in my studies of the Canadian hymenoptera. He kindly examined this species, and states that it "comes nearest to *Cryptus velox*, Cr., judging from description. I have another specimen in my collection from Colorado, but with the ovipositor a little shorter than in your specimen." It differs, however, from *C. velox* (to which I refer a species taken at Ottawa) in the entirely red legs, the darker wings with narrower areolet, the finer sculpture of metathorax, the shorter ovipositor with non-pubescent valves, etc., although the general appearance of the two species is much the same.

HEMITELES OCCIDENTALIS, n. sp.

Female—Length, 5 mm. Black, with rufous abdomen and legs. Face subtuberculate; edge of clypeus and mandibles rufous, palpi pale; antennæ piceous, the scape and basal joints of flagellum partly rufous. Metathorax areolated; legs, including coxæ, rufous, also the tegulæ. Abdomen polished; the petiole black, and terminal segments dusky; ovipositor as long as abdomen, sheaths piceous.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

HEMITELES PICEIVENTRIS, n. sp.

Female—Length, 3.5 mm. Black, with piceous abdomen and pale legs. Head finely punctulate above; palpi pale, antennæ piceous, 23-jointed. Thorax shining, the mesonotum finely punctulate, metathorax not spined, carinæ feeble; legs yellowish, the coxæ and posterior tarsi almost piceous; tegulæ pale, nervures and stigma brownish. Abdomen piceous, shining, the first and second segments finely punctulate, ovipositor scarcely as long as abdomen.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

CREMNODES CANADENSIS, n. sp.

Female—Length, 4.5 mm. Rufo-testaceous. Head viewed from above sub-quadrate, the face swollen as in Exochus, punctulate beneath antennæ; eyes small; antennæ 18-jointed, almost as long as body and moderately robust. Thorax more strongly constricted than in Pezomachus; metathorax sharply truncate and the angles strongly spined. Abdomen with the first segment slender, not expanded posteriorly, remaining segments compressed laterally, truncate at apex and strongly polished, the second more than twice as long as all the others; ovipositor very short.

Described from one ♀ specimen from Queen Charlotte Islands, sent by the Rev. J. H. Keen to Mr. Fletcher. A very interesting wingless species, with rufous head and abdomen, and testaceous thorax and legs. The compressed abdomen is more like that of an ophionid than of a cryptid.

PEZOMACHUS KEENII, n. sp.

Female—Length, 3–4 mm. Fulvo-ferruginous. Head slightly darker than rest of body ; antennæ 19–20 jointed, more or less obscured toward apex ; cheeks polished. Thoracic nodes subequal, not very prominent, faintly sulcate ; legs concolorous with thorax. Abdomen ovate beyond the first segment, which is rather suddenly expanded posteriorly ; terminal segments slightly yellow in one specimen ; ovipositor very short, sheaths black.

Described from four ♀ specimens from Queen Charlotte Islands, collected by the Rev. J. H. Keen, after whom I have much pleasure in naming the species, as a recognition of his efforts to advance our knowledge of the insect fauna of this distant portion of the Dominion.

SUBDIVISION OF THE PIERINÆ BASED ON PUPÆ.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

An oversight *(ante*, p. 167, line 27) leads me to state that it is in the Aporid section of the *Pierinæ* that the pupa has the abdominal segments 5 and 6 moveable, whilst in the Pierids proper only 5 is moveable. The *Pieridi* have until now always included the Aporid section ; as a matter of fact, many European systematists have placed our *Aporia crataegi* in the genus *Pieris*.

There can be no doubt that *Aporia* represents a very ancestral form of the *Pierinæ*, and, as such, is structurally different in all its stages from its Pierid allies ; at the same time I am firmly convinced that the *Aporidi* is as distinct from the *Pieridi* as is the *Anthocharidi*.

I am looking forward, with some degree of interest, to the records of observers which will tell us the American species of *Pierinæ* that have the pupæ with two (5 and 6) moveable abdominal segments *(Aporidi)* ; which species have but one (5) moveable segment *(Pieridi)*, and which are solid (*Authocharidi*), and how far the structure of the pupa agrees with the neuration of these types.

AN OMITTED PHYCITID.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

I have not been able to find in the Philadelphia List of Lepidoptera the following species :—

DIORYCTRIA, Zell.

Reniculella, Grt. *(Pinipestis)*, N. Am. Ent., 67 ; Pack., Bull. Dep. Agr. Ent., xiii., p. 21, 23 ; Fifth Rep. on Insects Inj. to Forest and Shade Trees, 854 ; Romanoff, Mem. Sur les Lep. Tome vii., Ragonot id. 200, Planche xxii., fig. 12.

My type is in the British Museum, where it has been examined by M. Ragonot, who compares it in his description with the European *D. abietrella*, from which this authority finds it to differ structurally. The figure in M. Ragonot's magnificent work seems to me excellent. I take this occasion to express my dissent from the classification adopted in the Philadelphia List. In 1878 I separated the *Epipaschiinæ (Epipaschiæ)* from the *Phycitinæ (Phycidæ)*. The two groups I regard as divisions of the Pyralidæ, equal in value to the *Crambinæ* and *Galleriinæ*. So far as I can discover, I first drew attention to the peculiar structure of the female frenulum in the *Phycitinæ*. At the time I did not know that the old term *Phycis* (used also by Walsh for our American species) had been superseded by *Phycita*. Messrs. Scudder and Burgess first gave us genitalic species ; Lederer had used the genitalia for subgeneric and generic divisions, and latterly is followed by Smith. Now comes Mr. Hulst, whose mission seems to be to carry out the methods of other entomologists to extremes, and gives us genitalic subfamilies.

Besides the above-mentioned species of *Dioryctria*, Mr. Ragonot figures the following North American *Phycitinæ* originally described by me : *Salebria contatella* and var. *quinque punctella*, *Meroptera pravella*, *Dioryctria aurantiacella*, *Pyla scintillans*, *Nephopteryx scobiella*, *Ambesa laetella*, *Dioryctria (Pinipestis) Zimmermanni*, *Acrobasis tricolorella*, *A. demotella*.

In my paper alluded to above, Bull. U. S. Geol. Survey, I gave, for the first time in American scientific publications, figures of the neuration and descriptions of the structure of the *Phycitinæ*. At the time only the first part of my intended work was prepared for the printer. I had purposed the working out of all the American genera in my collection. We have now a most carefully written and beautifully illustrated work by M. Ragonot, which can be studied with pleasure and profit by all American students occupying themselves with the collection of these little but very interesting moths.

DESCRIPTION OF A NEW SPECIES OF DORYCEPHALUS.

BY HERBERT OSBORN, AMES, IOWA.

Dorycephalus platyrhynchus, n. sp.

♂—Head produced and very flat, rounded in front, wings reaching tip of abdomen; colour gray-brown. Length, 9 mm. Length of head, 2.3 mm.

Head thin foliaceous, margins very thin, a median, thicker space, which beneath widens to base of head, forming a convex keel. Eyes touching prothorax. Ocelli on margin of head, just in front of eyes, a rather obscure mottling of brown along the disk of the head and forming a rather distinct median stripe, a dark stripe under the tip of the head, dividing and passing along the margins of the keel, a distinct blackish line under the eye, and extended as a brownish stripe on thorax. Prothorax transverse, with five slightly elevated convex ridges, the anterior margin nearly straight, with slight sinuosities, the posterior margin concave in front of the scutellum. Scutellum wider than long, convex in front, with an acute point at the apex between bases of elytra, with a transverse furrow behind the middle, deflected laterally. Elytra strongly veined, costal margin arcuated, with a humeral furrow, very minutely punctate. Legs rather slender, anterior femora fuscous beneath. Middle and posterior femora with rows of fuscous dots forming a stripe beneath. Tibiæ fuscous beneath.

Described from two male specimens, one collected at Ames, Iowa, by Prof. C. P. Gillette, the other collected at West Point, Nebraska, by Prof. Lawrence Bruner.

Female larger than male; pale yellow, with dark median line on head and prothorax. Length, 14.5 mm. Head longer than in male, central carina above darker. Elytra short, reaching one-half way on to the 4th segment of the abdomen. Wings shorter, reaching nearly to posterior margin of the 2nd segment of the abdomen. Abdomen elongate and acuminate. First 6 segments about equal in length; 7th narrow, elongate and combining with remaining segments to form the sheath of ovipositor. Ovipositor long, the sheath simple beginning at the 5th ventral segment.

Since forwarding the description of the male a special student in entomology, Mr. E. D. Ball, has brought in another male and the female here described.

The larger size and elongate, slender abdomen gives this quite a different appearance from the male, but I think there can be no question as to the identity of the two forms. The specimen in hand has somewhat the appearance of being fresh from the pupa stage, on account of the lighter colour and soft appearance of the body, but the wings appear fully developed, and in other respects it indicates maturity.

SOME INDIANA ACRIDIDÆ.—III.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

In the two preceding papers of this series 36 species and 3 varieties of Acrididæ have been recorded as occurring in Indiana. Since the last paper, published in the ENTOMOLOGIST for February, 1892, appeared, five additional species have been taken within the State, and many facts have been gathered concerning the life history, habits and range of the species previously recorded. Moreover, my private collection has been largely increased by exchange for specimens from other parts of the United States, and I have possessed myself of almost all the literature extant upon the group, so that I am enabled to clear up a few mistakes in synonymy which crept into my first papers.

ACRIDIDÆ.

ACRIDINÆ.

OEDIPODINI.

1. AULOCARA SCUDDERI, Bruner.

Aulocara Scudderi, Bruner, Proc. U.S. Nat. Mus., XII., 1890, 63.

This small locust was first taken in Indiana on July 6th, 1892, from the sandy bed of the old Wabash and Erie Canal, five miles north of Terre Haute, Vigo Co. Other specimens were secured at the same locality in September of that year, and in September and October of 1893.

On one side of the canal, at the point mentioned, is a large pond, occupying perhaps 50 acres of the Wabash River bottoms, and on the other side is a sandy hill or bluff of the river, which is covered with typical prairie grasses and plants. The locust has been found only in an area of about five acres, on the side of the hill, and in the bed of the canal. When disturbed it leaps vigorously, and without noise, for several times in succession; then, settling down on a sandy spot, it will allow a close approach, evidently relying upon the similarity of colour between its body and the sand to shield it from observation. According to Bruner, *loc. cit.*, it is a very common species west of the Mississippi; but this I believe, is its first record east of that stream, unless the species mentioned by McNeill, in his "Illinois Orthoptera,"* as *Philobostroma parva (?)*, be the same.

*Psyche, VI., 64.

2. SPHARAGEMON OCULATUM, Morse.

Spharagemon oculatum, Morse, Proc. Bost. Soc. Nat. Hist. XXVI., 1894, 232.

On August 1, 1892, I visited Lake Maxinkuckee, Marshall Co., Indiana, and in a sandy, fallow field, near the south-western border of the lake, I found this locust to be quite abundant in company with *Spharagemon bolli*, Scudder. They never leaped when disturbed, but used the wings to propel them in a flight of about 30 yards; the males making a faint crackling noise as they cleared themselves from the earth, while the females were noiseless. A number of pairs were taken in copulation on this date.

On August 17, 1893, I again visited the locality, and found the field to be in corn, but the *Spharagemon* was very common over about two acres of the most sandy portion. Resting on the soil between the rows, they were very difficult of detection, and eight times out of ten were not seen until flushed, unless they had previously been "marked down" as they alighted. A few were also taken from the sandy margin of the lake, but careful search over a wide extent of territory failed to reveal them elsewhere.

Without specimens for comparison, and from the literature at hand, I determined them doubtfully as *Spharagemon collare*, Scudder, and sent specimens so named to Prof. A. P. Morse, who was making a detailed study of the genus. He found that they differed from the type specimens of *collare* in Mr. Scudder's collection, and so described them as new, under the name cited above.

3. TRIMEROTROPIS MARITIMA (Harris). The Maritime Locust.

Locusta maritima, Harris, Ins. Inj. to Veg., 1862, 178.
Oedipoda maritima, Uhler, in Harris Rep., *loc. cit.*
Scudder, Bost. Journ. Nat. Hist. VII., 1862, 472.
Thomas, Syn. Acrid, N.A., 1873, 124.

Trimerotropis maritima, Stal, Recens. Orth., I., 1873, 135.
Scudder, Dist. Ins. N. Hamp., 1874, 378.
Thomas, Ninth Rep. St. Ent., Ill., 1880, 113.
Fernald, Orth., N. Eng., 1888, 45.

Among a number of Orthoptera which were collected by Prof. E. E. Slick at Michigan City, Indiana, on September 18, 1892, and forwarded to me, was a single ♀ of this species. I immediately returned it to him with the request that, if possible, he secure a number of others. On October 15, there having been several severe frosts in the meantime, he sent 18 additional specimens, 6 of which were ♂'s. At the same time he wrote concerning them as follows: "Some were found dead and others could but jump one or two feet. I did not realize when the first lot was sent how nearly these were like the sand, because they were so wild. They were never more than 100 feet from the edge of the water (Lake Michigan), and never along even the hillsides."

The only record which has come under my notice of the occurrence of *maritima* west of the Atlantic coast is the brief one given by Thomas in his Ninth Illinois Report, *loc. cit.*, where he says: "This has been discovered only in the extreme northern part of the State;" but he does not state when nor by whom it was taken. McNeill includes it in his list of the Illinois Orthoptera (PSYCHE VI., 64), on the strength of the above statement by Thomas.

Mr. Scudder, in his Distribution of Insects in N. Hamp., *loc. cit.*, writes of it as follows: "This curious grasshopper is a good example of mimicry, for it so closely resembles the colour of the sand on a sea beach that it is difficult to see it when alighted. It is found only in such localities, and reaches its northern limit about the narrow part of the State washed by the sea. South-west it extends at least as far as New Jersey."

TETTIGINÆ.

4. TETTIX ARENOSUS, Burmeister,

Tettix arenosa, Burmeister, Handbuch II., 1838, 659.
Tettix arenosus, Scudder, Proc. Bost. Soc. Nat. Hist., XIX., 1877, 90.
Bolivar, Essai Sur. les. Tettig., 1887. 95.
Tettix ornatus, Scudder, Bost. Jour. Nat. Hist., VII., 1862, 474 (In part.)
Thomas, Syn. Acrid., 1873, 184 (In part.)
(Not *Tettix ornatus*, Say.)

In Indiana this grouse locust is much less common than *T. ornatus*, Say, with which species it has been confounded by many writers. Burmeister's description was so short and unsatisfactory that unless one could examine his types it is impossible to determine what species he had at hand.

Bolivar, in his "Essai," separates the group containing *ornatus* from that containing *arenosus* by the difference in the relative length of the pronotum, but collectors of these insects know that this character is of little value on account of its great variation in the same species. Moreover, he gives the length of pronotum of *ornatus* as 7 5-9 mm., and states that it does not exceed the tip of the posterior femora. A glance at Say's description and figure will show that he was wrong concerning both of these points, as the length of pronotum there, and the average length in many specimens at hand, is about 11.5 mm.

Arenosus, as I have it separated in my collection, is a somewhat shorter and broader species than *ornatus*, and with the median carina of the pronotum and vertex much more distinct. The granulations on the pronotum are longer and more irregularly distributed, and, especially on the posterior half, have a tendency to arrangement in short, oblique waves or ridges, while the median sulcus of the face is wider in its lower half than in *ornatus*.

The general colour of *arenosus* is darker and the annulations of the antennæ and legs are much more distinct than in *ornatus*, which in colour is an exceedingly variable insect. But little practice is necessary to quickly distinguish the two species in the field.

Arenosus in this vicinity is found in small numbers about gravelly hillsides, and occasionally in company with *T. cucullatus* about the borders of streams, while *ornatus* is a very common species in dry upland woods.

5. TETTIX GRANULATUS (Kirby).

Acridium granulatum, Kirby, "Fauna Bor. Am., IV., 1837, 251."
Tettix granulatus, Scudder, Bost. Journ. Nat. Hist., VII., 1862, 474.
Thomas, Syn. Acrid. N. A., 1873, 182.
Bethune, Can. Ent. VII., 1875, 130. (Copy of Orig. Desc.)
Riley, Rep. U. S. Ent. Comm., I., 1877, 256, fig. 11.
Bolivar, Essai Sur. les Tettig, 1887. 91.
McNeill, Psyche, VI., 1891, 77.

Tettix ornata, Harris, Ins. Inj. to Veg., 1862, 186. (Not *Tettix ornatus*, Say.)

I have found this species in both Vigo and Fulton counties, and McNeill, *loc. cit.*, has recorded it from Franklin Co., Ind.

In Vigo Co. it is evidently scarce, as I have taken it only in winter from beneath logs, in the vicinity of the large pond mentioned above, under *Aulocara Scudderi*. In Fulton Co., 150 miles north, I found it very common in the depths of a tamarack swamp, in company with *Tettigidea polymorpha*, Burm.

In life, the inner wings of *granulatus* are bluish or bottle green, a character I do not remember to have seen noted by any previous writer.

It is an insect of wide distribution, extending from ocean to ocean, and northward through British America. Vigo county is probably near the southern limit of its range.

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NOTES ON SOME OF THE SPECIES MENTIONED IN THE PREVIOUS PAPERS.

LEPTYSMA MARGINICOLLIS, Serville. (C. E., XXIV., 28.*)

The only habitat of this species in Indiana, known to date, is the margin of the large river bottom pond mentioned in my previous paper. This has been partially drained, and, as a result, the locust was quite scarce in the autumn of 1893. I was much surprised, however, to find there, on May 21st, a fully developed male, with soft, flabby wings, as though just moulted, though no others of any age were seen on that date.

TRUXALIS BREVICORNIS, Linn. (C. E., XXIII., 75.)

This has proven to be a rather common species about the margins of marshes, ponds and lakes. In Vigo county it reaches maturity about August 10th. It has been taken in Fulton and Marshall counties, thus extending its known range 150 miles northward.

CHRYSOCHRAON VIRIDIS, Scudder. (C. E., XXIII., 75.)

The brown form of this species far outnumbers the green one in this locality. It has been taken in copulation as early as July 15. The spring and early summer of 1892 were very damp, it raining almost every day in the month of May. In the latter part of July hundreds of dead and dying specimens of this species and of *Melanoplus bivittatus*, Say, were

*The references refer to the volume of Can. Ent. in which the species was previously mentioned by myself.

to be seen in the tops of iron weeds. They were principally ♀'s, and their death was probably due to the insect fungus, *Entomophthora calopteni*, Bessey, an interesting account of which appeared in Bull. 22, U. S. Dept. Agr., 1890, 104. The disease was, perhaps, more abundant on account of the young being exposed to so much dampness in May and June. In two instances females of *Melanoplus differentialis*, Thomas, were discovered feeding upon the dead bodies of *C. viridis*, the abdomens and soft portions of the thorax having been wholly devoured.

CHLOEALTIS CONSPERSA, Harris. (C. E., XXIII., 75.)

The ♂'s of this species are among the rarest locusts found in Indiana. Six years collecting have yielded me not more than as many perfect specimens. The ♀'s are by no means common, seldom more than four or five being seen in a day's collecting.

Mr. S. I. Smith* and Mr. S. H. Scudder† have each given an interesting account of the egg laying habits of the ♀ *conspersa*. On August 11th, 1893, I discovered a ♀ in the act of boring a hole in the upper edge of the topmost board of a six-plank fence. The abdomen was curved downward, and the forcipate valves of the ovipositor used as pinchers with which small pieces of the wood were broken off. When discovered, the abdomen was inserted nearly one-half an inch in the pine board, and the upper edge of the opening about the sides of abdomen was covered with small pieces of wood, just as the dust or borings will accumulate about the edge of a hole which a carpenter is boring.

I stood by and watched her work for ten or more minutes, when she suddenly stopped, withdrew her ovipositor and hopped away. Along the fence, within a distance of 30 feet, I found 15 other holes, 11 of which were fresh, while the others had evidently been bored the previous year. Most of these were on the upper edge of the top board, which was in all cases of pine and perfectly sound. None of the holes contained eggs, most of them being less than half-an-inch in depth.

On September 21st I found two ♀'s ovipositing in the sides of a rotten stump. Their abdomens were inserted their full length, and when removed eggs were found in the lower horizontal portion of each cavity.

CHLOEALTIS CURTIPENNIS, Harris. (C. E., XXIII., 76.)

This has proved to be a very abundant species among the tall grasse of the low, damp prairies of Northern Indiana.

*Rep. Conn. Board of Agric., 1872, 375.

†"Distribution of Insects in New Hampshire," 371.

PEZOTETTIX GRACILIS, Bruner. (C. E., XXIII., 81.)

Mature specimens have been taken as early as June 25th. By July 4th it is common, especially upon the iron weeds (*Vernonia fasciculata*, Mich.) which grow abundantly in low, open woods. It has been found in copulation at this date and as late as November 10th, though whether there is more than one brood each season, I have not been able to ascertain.

(To be continued.)

A LEAF-TISSUE GALL ON MOUNTAIN COTTONWOOD.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA.

A fleshy leaf-tissue gall was found on terminal twigs of *Populus Monilifera(?)* June 18, 1892, a few miles to the north of Ojo Caliente, in Southern Socorro county, New Mexico. This gall is somewhat similar in method of formation to one that has been found on *Rhus microphylla*, which possesses a cock's-comb-like appearance.

Gall.—Diameter (after being thoroughly dried and much shrunken) of four galls: 15 by 12 mm.; 17 by 19 by 14 mm.; 20 by 14 mm.; 22 by 20 by 18 mm.; the length (extent on stem) being less than width. Gall rather irregular in outline, fleshy, growing more or less in irregular sections, clustered together around the twig, but springing from side stems, consisting of a mass of fleshy, abnormally developed and degraded leaf-tissue massed together. Colour, red on all surface exposed to the sun; the lower or inner surface next the centre of the tree, when not so exposed, but sheltered by the foliage, greenish. The irregularity of the external surface of the gall is due to the various groups of massed leaf-tissue being independently and unequally developed, with spaces between.

Four galls. Two cast skins were found on the surface of these. The skins appear to be hemipterous, possibly homopterous. The fleshy sections of tissue contain cavities within, but there is no trace of the gall maker.

ON SOME NORTH AMERICAN SPECIES OF CHIONOBAS.

BY DR. HERMAN STRECKER, READING, PA.

Last December Mr. H. J. Elwes gave a revision of the genus Chionobas in Trans. Ent. Soc., London, to which Mr. W. H. Edwards, in the March number of the CAN. ENT., gives "notes," or rather exceptions, in which he still contends that *Gigas*, *Californica* and *Iduna* are three distinct species, but now allows *Nevadensis*, which he formerly considered also to be distinct, to be a synonym of one of these, but does not know of which. Elwes has placed these four as one species, just as they are in the "Synonymical Catalogue" issued by me in 1878, nor can I understand how anyone can imagine there is more than one species under the four names; there is absolutely no point by which any of the examples can be separated, whether they come from California, Washington, Oregon or elsewhere; were they to be mixed indiscriminately, without locality labels, no one could say from whence came this or that example, or which was this or that so-called species.

With *Subhyalina* Elwes has followed our Syn. Cat. in the same way, with the single exception, an important one, that he has given the name *Subhyalina* priority over *Crambis*, which it really has by right of publication, if the two names belong to the same insect, but the doubt surrounding the former name, which I believe belongs to an Erebia, influenced me in placing Freyer's name first. The description of *Hipparchia Subhyalina* in appendix to Ross's 2nd Voyage, evidently fits *Erebia Fasciata*, or a variety of it, and, as Edwards suggests, the example in Oberthür's collection submitted to Elwes may not be the type, as certainly, if it is the same species as Bean took in N. W. Territory, it in no wise agrees with Curtis's description.

Ch. Alberta, which Edwards insists is *Varuna*, is a smaller form of *Chryxus*, of which I have good examples, ♂ ♀, received from Morrison a number of years since, who took them in Idaho; Elwes's types came from Calgary; he says in the collection of a Mr. Wolley-Dod, from whom he obtained them, were also examples of *Varuna*. At the same time I received from Morrison *Alberta* ♂ ♀; he also sent *Varuna*, ♂ ♀, taken at same locality. There is no difficulty in distinguishing these two, as *Varuna* is a variety or form of *Uhleri*, whilst *Alberta* occupies the same position towards *Chryxus*. *Varuna* I also have from Bean, in N. W. Ty., and from Morrison, from Arizona. I have *Uhleri*, from Colorado, not to be distinguished from *Varuna*, from Idaho and Arizona. The female of

Alberta, which was unknown to Elwes, differs, as is usual in the genus, from the male, in the wings, being broader and more rounded; the colour is same as ♂; the outer edge of mesial band on under side of secondaries is markedly defined, but the whole space from that edge to the base of the wing is heavily striated. Of *Chryxus* I have examples from Utah of the pale yellowish colour of *Nevadensis*, which, on the upper surface, they so wonderfully resemble as to be almost mistaken for medium-sized examples of that species. There are yet fairly strong grounds for Elwes's first impression that *Ivallda* was a variety of *Chryxus*, as the only apparent difference worth noting is that of colour, but there is too little of *Ivallda* known to form any certain conclusion.

From Morrison I also received a ♀ Chionobas, taken by him at Mt. Graham, Arizona. The easiest way to describe this would be to say it is the counterpart of *Ch. Fulla*, Ev., from the Tarbagatai, a species but little known in American collections; this closely-allied American species, which we might designate as *Ch. Daura*, expands nearly 1¾ inches, is whitish ochraceous, almost the colour of *Ivallda*, the primaries finely striated on costa, a broad, submarginal band scarcely a shade paler than the part interior to it, from which it is separated by a brown line produced in an angle at 2nd discoidal nervure, from whence it recedes inwardly at the costa; in this band are three small black spots, in cells 2, 3 and 5 the uppermost one largest and minutely pupilled with white. A gray marginal band. Fringe from anal angle half way brown, rest brown and whitish alternately. Inferiors have a broad, pale, submarginal band, on which, in cell 2, is a minute black dot or point. The mesial band defined by a dark shade at edges. A gray marginal band. Fringe whitish, with brown at termination of veins. Reverse surface paler than above. Secondaries almost white, markings of upper surface reproduced. Primaries towards exterior margin delicately striated, the spot in cell 3 wanting. Inferiors most daintily mottled, much finer than in its Asiatic analogue or in any other American species. A broad mesial band very distinctly defined and shaded with dark brown at its edges. Towards the margin of the wing a tendency in the mottling to segregation. Fringes on all wings as above. I have only seen this one ♀ example, and on one example it is not to be known whether this be identical with the Central Asiatic species compared with it (to my examples of which its resemblance is amazing), which is possible, but scarcely probable, or whether it be distinct, which, as far as the American species are concerned, it certainly is, is one of those problems the future must solve.

Ch. Brucei, W. H. Edw., I cannot separate from *Bore*, at least not from the examples of the latter I have from Dr. Staudinger, who, as an authority on the Palæarctic fauna, has no peer.

Ch. Beanii, Elwes, will easily be known always by its almost uniform dark smoky hue, and will hold its own; *Assimilis*, with which Edwards confounds it, being only a synonym of *Crambis*, Frey.

The true *Ch. Semidea* I have in numbers from Okkak, Labrador, and they differ in nothing from the Mt. Washington ones, as neither do several in my possession from Hudson Strait. Those from Colorado (which Edwards claims are *Oeno*) in some instances, especially in the females, have a slightly more ochrey shade, and the secondaries beneath are not so darkly coloured in the moss-like mottling, but these are entirely too slight grounds to sustain any claims to specific distinctness. I possess three distinct species from Labrador, viz., *Semidea*, *Crambis* and *Taygete*, and the two first are as easily separable from each other as from the last.

As to the value of the clasper depended upon by Mr. Elwes in associating species, I certainly have no "practical experience in the matter," having never given it much attention, hence can offer no opinion, though from what I have noted of other instances of sexual peculiarities they sometimes would unite species otherwise by no means close.

NOTES ON SOME OF THE NOCTUÆ IN THE BRITISH MUSEUM COLLECTION.

BY J. W. TUTT, F. E. S. (EDITOR OF "THE ENTOMOLOGIST'S RECORD"), LONDON, ENGLAND.

Some remarks made by Mr. Grote in his "Note on *Acronycta cristifera*" lead me to support his contention that in the British Museum "types may have become misplaced." I am, of course, simply a specialist at European NOCTUÆ, and only such material from outside countries as helps my work (more especially with the British species) has any great interest for me, and only so far as this can any remarks that I make be considered of value.

In writing my *British Noctuæ and their Varieties*, I was obliged to refer continually to the British Museum material. The NOCTUÆ had then just been re-arranged by Mr. Butler, and it had been re-arranged in the very tip-top of museum methods. The great Zeller collection had been incorporated, Mr. Grote's collection ditto, and the result no one can imagine. I maintain that collections of this kind have an inherent value

in themselves, and that as soon as they are broken up no man can judge for a moment what the original possessor intended, whereas if we can only see the collection as a master left it, we can understand at a glance what he intended.

To illustrate my point. In lumping the various collections together the most ridiculous errors have been made, even with the commonest British species. We have a common British species, very common indeed within two or three miles of the British Museum, *Hadena thalassina*. This species every youngster here gets his first season. In the Museum collection, as arranged by Mr. Butler, it consists of eight *Hadena (Mamestra) thalassina*, two of *H. adusta* and four of *H. genistæ;* the last specimen of *N. margaritacea* is a typical *N. glareosa;* the two last specimens under the name of *N. punicea* are specimens of *N. umbrosa*. Four specimens of *Agrotis nigricans*, var. *carbonea*, are placed in the series of *A. tritici*. A very fine series of the grey type of *Agrotis* (*Pachnobia*) *hyperborea* is in the Museum under its true name, but the "types" of its red British variety, *carnica*, are placed right away in another drawer, mixed up with another species, *P. carnea*. Struck, apparently, by the similarity of the names—*carnea* and *carnica*—the two red specimens of a distinct species have been put into the series of another species which has no affinities with the first. So much for some of the errors of lumping, which I can vouch for.

Now, there is another little matter which should interest American entomologists, and which, I am sorry to say, puts Mr. Butler's inability to see even the most striking specific characters in a strange light. It refers to *Leucania* (*Heliophila*) *pallens* and *L. straminea*. Mr. Butler writes: "*L. pallens*, of the United States, agrees absolutely with the European *L. straminea*. The two forms have practically the same characters, and, if received from any extra European locality, would never have been considered distinct; indeed, it is possible to find examples which cannot with certainty be referred to one form rather than the other. *L. straminea* differs chiefly in the generally more prominent pale longitudinal streak above the median vein of the primaries, and the better-defined black or dark markings. Not having bred both from the egg, I have kept them separate in the collection." (Trans. Ent. Soc, London, 1890, pp. 660–661). A reference to the British Museum material, on which the remark was based, shows that they have *not* been kept separate, and of a whole row thus named by Butler, only seven specimens are *straminea*, and not one

of these came from America. The two species are much more distinct than *Vanessa cardui* and *V. Atalanta*, and I cannot imagine even the veriest tyro, if a field naturalist, considering them identical, and still less do I follow that the only reason for making them separate is that they do not "come from extra European localities" (what a condition the extra-European species in the British Museum cabinets, as recently re-arranged, must be in, if named on these lines, I must leave the "extra-European" naturalists to imagine!) whilst it is to be noted that the only differences which Mr. Butler sees are "the generally more prominent pale longitudinal streak above the median vein of the primaries" and "the better-defined black markings," when, as a matter of fact, it is difficult to find a point of similarity,—the thoracic crest in *straminea*, the differently shaped wings, the sexual variation in the hind wings, development of the pale nervures, etc., all pointing to complete distinctness, and all this muddle about two species which swarm on the Thames' marshes in the south-east district of London, only a few miles, as the crow flies, from the British Museum, and which have different larvæ feeding at different times in different ways on different food-plants.

I cannot say how extremely sorry I was to find this condition of affairs in our National Museum, but it is a most serious matter, and the condition of the collections in the British Museum is a matter for the consideration of scientific men all over the world.

Two things I would ask American entomologists to do. (1) To take nothing published on the NOCTUÆ in the British Museum for granted, and to be sure to verify each individual statement. (2) To insist, in season and out of season, that collections left by eminent men shall be left intact, so that specialists may form their own conclusions. The lumping process, which results in the production of such a condition of affairs as I have pointed out at length in the Introduction to Vol. IV. of my *British Noctuæ and their Varieties*, is a matter for the consideration of every scientific man.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

III. The Melolonthine Scarabæidæ of Ontario and Quebec.

The members of this group are distinguished, as already stated, by the position of the abdominal spiracles, which are placed in part on the superior portion of the ventral segments, the rows feebly diverging; the last spiracle usually visible behind the elytra. Secondary sexual characters are displayed often in the antennæ, the club being longer in the males; the legs and ventral segments also often give us a clue to the sex of the specimen, as will be shown in the proper place. The following partially artificial key will enable the genera to be properly identified so far as the recorded species are concerned.

A. Middle and hind tibiæ with only one spur, which is sometimes obsolete. No onychium, body scaly..... *Hoplia.*

AA. Middle and hind tibiæ with two spurs, onychium well developed.

b. Form elongate, slender; colours metallic green or bronze (at least in part) or yellow.

Elytra not densely scaly; claws chelate..... *Dichelonycha.*

Elytra densely covered with ochreous scales; claws not chelate ..... *Macrodactylus.*

bb. Form robust, heavy; colour brownish, sometimes iridescent, pubescent, or somewhat irrorated.

c. Ventral segments five. Elytra either uniformly rather finely punctured or with punctured striæ..... *Diplotaxis.*

cc. Ventral segments six.

d. Elytra with rather indistinct but regular sulci or grooves on the disk. Size small..... *Serica.*

dd. Elytra without striæ or sulcations over the greater portion of the disk. Size larger.

Antennæ with the third joint not elongate, the club three-jointed..... *Lachnosterna.*

Antennæ with the third joint greatly elongate, the club three-jointed ..... *Polyphylla.*

In using the above table care must be taken to count *all* of the ventral segments—the first or last is in danger sometimes of being overlooked. A reference to the specific characters, as given in the following synopsis, however, will aid inexperienced workers in clearing up possible doubts.

It is perhaps unnecessary to mention that a fairly good lens should always be at hand to aid the eye in discriminating the more difficult species.

HOPLIA, Ill.

These are oblong insects, more or less flattened above, and covered either entirely or in part with scales, ordinarily yellowish, brownish, greenish or of metallic lustre. The claws are chelate. The two sexes often differ in size and colour, and the males have thicker hind tibiæ and tarsi. They are found on flowers during the day. Following the scheme of Dr. Leconte, the Canadian species may be thus distinguished:

A. Claws of hind tarsi not cleft.

Prothorax wide, narrowed in front, sides subangulate and rounded. Sexes dissimilar in colour; the ♂ black, hairy, with cinereous pubescence, sprinkled beneath with silvery scales; ♀ brown, very densely clothed with pale brown and yellowish silvery scales..... *trifasciata*, Say.

Prothorax wider in front of the base, sides strongly angulated. Sexes similar, clothed with oval ochreous scales... *mucorea*, Germ.

AA. Claws of hind tarsi cleft near the tip; sides of prothorax broadly rounded, front and middle tarsi with two claws..... *modesta*, Hald.

The *Hoplia tristis* of the Society list is the male of *trifasciata* according to Dr. Leconte.

DICHELONYCHA, Kirby.

Elongate beetles, usually piceous or testaceous in colour, often with a distinct green or bronze lustre, found on young shoots or the leaves of trees. The claws are chelate (*i.e.*, capable of being folded along the tarsi). The male has the club of the antenna nearly as long as the funiculus, and the outline of the middle line of the abdomen is concave when viewed in profile. The table as given below will assist in identification:

A. Thorax without median groove, but sometimes with a line.

b. Legs almost entirely black..... *Backii*, Kirby.

bb. Front and middle legs testaceous, tip of hind tibiæ and the hind tarsi piceous..... *elongata*, Fab.

bbb. Legs entirely testaceous.

c. Anterior tibiæ with the upper tooth obsolete, *Canadensis*, Horn.

cc. Anterior tibiæ tridentate.

Median line of thorax faint, punctures coarser..... *subvittata*, Lec.

Median line of thorax wanting, punctures finer.....*testacea*, Kirby.

AA. Thorax with deep median groove, disk punctured in an even space each side.....*albicollis*, Burm.

MACRODACTYLUS, Latr.

Fig. 25.

The "Rose-bug," *M. subspinosus* (Fig. 25), is the only recorded Canadian species of this genus, and is probably too well known to need an extended description. It is an elongate insect (about .35 inch) with very long and slender legs, the body covered with ochreous scales to the extent of obscuring the real colour. The thorax is very long and angulate on the sides.

SERICA, MacLeay.

Two species are recorded from East Canada. They are robust convex insects of rather small size (.35 to .42 inch), broader behind, giving them a very characteristic appearance. The species fly chiefly in the evening, and during the day may be found under leaves in the woods. They are easily separated thus:

Body not iridescent, clypeus with a small acute incisure each side.....*vespertina*, Gyll.

Body iridescent, clypeus without incisure.....*sericea*, Ill.

DIPLOTAXIS, Kirby.

These beetles are easily known from *Serica*, to which they bear some resemblance, by the elytra not being sulcate, but either simply punctate or with the punctures arranged in rows, the rows in pairs. The wider interspaces are irregularly punctured; the body is less convex and less dilated posteriorly than in Serica. The species of the region under consideration may thus be known:

A. Body pubescent, elytra without distinct rows of punctures..*sordida*, Say.

AA. Body not pubescent above, elytra distinctly punctate-striate.

Thorax with scattered punctures, leaving smooth spaces near the middle.....*liberta*, Germ.

Thorax densely and more finely punctured.....*tristis*, Kirby.

LACHNOSTERNA, Hope.

This genus, formerly in confusion in all cabinets, has lately had the attention of Dr. Horn, who has developed characters that may be

used with profit in synoptic tables, and thus rendered the task of identification much less difficult, though from the extent of the group there is necessarily still trouble in certain portions of the series. In the following table I have used chiefly the points first recognized as important either by him or by Dr. Leconte, but by a somewhat different, if more artificial, sequence, am able to do away with the necessity of using the fixity or freedom of tibial spurs of the male as a prime character, this being somewhat difficult for a beginner to demonstrate without softening the specimen. The ventral ridge referred to as separating the forms of the *fusca* group is to be found near the hind margin of the ventral segment immediately preceding the last.

Though the species of *Lachnosterna* are ordinarily easily separated from those of any other Eastern American genera by their facies (Fig. 20, page 197, *Lachnosterna fusca*) their extreme similarity amongst themselves is such as to practically debar the formation of a table based on easily seen characters, and the females must usually be associated with their appropriate males by comparison. They have been almost entirely left out of account in the second division (AA) of the accompanying table :

A. Body above conspicuously hairy or pubescent.

b. Antennæ 9-jointed; body above sparsely clothed with erect hairs..... .*hirsuta*, Knoch.

bb. Antennæ 10-jointed.

Elytra with series of erect hairs arranged in vittæ..... .....*hirticula*, Knoch.

Elytra with sparse short pubescence, longer at base. .....*tristis*, Fabr.

Elytra pruinose, pubescence uniform, recumbent. *ilicis*, Knoch.

AA. Body without conspicuous hairs or pubescence above.

c. Inner spur of hind tibiæ ♂ very short, the outer long and slender.....*ephilida*, Say.

cc. Inner spur of hind tibiæ ♂ at least moderately long (usually half as long as the other or more).

d. Yellowish-testaceous, form slender, subcylindrical, size small (.41 to .52 inch.).....*gracilis*, Burm.

dd. Colour darker, form more robust, never notably slender, size larger.

Fig. 26.

e. Inner spur of ♂ hind tibiæ arcuate and angularly bent at tip, somewhat sigmoid in form (see fig. 26).....*gibbosa*, Burm.

ee. Inner spur of ♂ hind tibiæ at most slightly curved.

f. Antennæ 9-jointed.

g. Sutural stria well impressed, the costa of normal convexity.

Form oblong-oval, last ventral of ♂ convex, sometimes with a median channel.....*implicita*, Horn.

Form elongate, last ventral of ♂ broadly concave with longitudinal median impression.....*villifrons*, Lec.

gg. Sutural stria indistinct, costa scarcely elevated.....*limula*, Horn.

ff. Antennæ 10-jointed.

h. Clypeus moderately closely punctate only, the sides of the thorax entire, disk never very coarsely punctate.

Ventral ridge of ♂ long, arcuate, overhanging for its full length behind.....*dubia*, Smith.

Ventral ridge of ♂ longer, slightly curved, the ends only overhanging behind.....*fusca*, Fröh.

Ventral ridge of ♂ nearly straight, not overhanging behind.....*grandis*, Smith.

hh. Clypeus densely punctate.

i. Thorax broadest at base, margin entire or slightly crenate, disk variably punctured.

Last ventral of ♂ vaguely longitudinally impressed.....*marginalis*, Lec.

Last ventral of ♂ with cupuliform fovea..*fraterna*, Harr.

ii. Thorax widest at middle, margin distinctly crenate, disk coarsely punctate.

Punctures of thorax regularly placed. . . *profunda*, Blanch.

Punctures of thorax irregularly placed, the median line and often lateral spaces smooth .... *rugosa*, Mels.

Of the species above given, *grandis* is reported (in Canada) only from Nova Scotia, and *limula* from "south of Hudson's Bay." A few of the others are simply recorded from "Canada" without more definite locality; but as they occur in the adjacent United States, they are in all probability to be met with in the provinces under consideration. The *cognata* of the Society's list is simply a variety of *fraterna*, in which the thoracic punctures are equal in size and the margin irregular; *subtonsa* is a synonmy of *ilicis*, according to Dr. Horn.

Fig. 27.

POLYPHYLLA, Harr.

The only form found in East Canada is *P. variolosa*, Hentz (Fig. 27), a very fine, large insect, nearly or quite an inch in length. The form is something like that of *Lachnosterna*, but the upper surface is marked with three white vittæ on the thorax and indistinct lines and spots on the elytra, of whitish scales. The antenna of the ♂ is furnished with a very long club.

OBITUARY.

Died, in New York City, 21st April, 1894, Mrs. Julia Perkins Ballard, wife of Prof. Addison Ballard, now of New York University, but for many years of Lehigh University. It was at Easton, Pa., that Mrs. Ballard became interested in entomology, and her personal experiences were published in the little volume, "Insect Lives, or Born in Prison," later revised and much enlarged, under the name of "Among the Moths and Butterflies," Putnams, 1890. Mrs. Ballard was enthusiastic in her studies, and her charming books have done much to foster a love of history among the young people.

W.

NEW CYNIPIDÆ.

BY C: P. GILLETTE, FORT COLLINS, COLORADO.

(Continued from page 159.)

CYNIPS, Linn.

C. washingtonensis, n. sp.

Galls of this species were sent me by Mr. Trevor Kincaid, of Olympia, Washington, who writes that they were collected from the twigs of *Quercus garryana*. The galls are ellipsoids, from 5 to 7 mm. in greatest diameter; they are smooth, monothalamous and snuff coloured, both externally and internally, and are attached by a small projection to the side of small twigs. A few specimens that appear not to be mature are greenish in colour, and have shrivelled somewhat on drying, so that the surface is covered with small, shrunken areas. The substance of the gall is uniformly and densely cellular. Described from 13 galls.

Gall-fly.—General colour a dark brown, inclined to black. *Head* small, blackish in colour, tinged with rufous; antennæ of the same colour as the head, 14-jointed, 3rd joint once and a-half as long as the 4th. *Thorax* finely rugose and rather coarsely punctured, parapsidal and median grooves distinct near the scutellum, the former extending half way to the collar, the latter less than half way. The two parallel lines extending back from the collar and the lines over the bases of the wings are the blackest parts of the mesothorax. Scutellum rugose, foveæ scarcely discernable; pleuræ finely punctured, the punctures giving rise to hairs; colour of pleuræ rufous. *Abdomen*, except a large patch on the dorsum of the 2nd segment and a narrow line over the succeeding segments, densely set with silky pubescence, the hairs rising from minute punctures. *Wings* hyaline, 5 mm. long, nervures slender, radial area long and narrow. *Feet* of a light chestnut colour, the tarsi being darkest, densely set with a fine pubescence. Length, 4 mm.

Described from one bred female.

ANDRICUS, Hartig.

A. spongiola, n. sp.

Galls of this species were also sent me by Mr. Kincaid, who writes that he took them from limbs of *Q. garryana*. They are polythalamous, globular, buff-coloured galls measuring from 3 to 5½ cm. in diameter; some of the galls are tinged with salmon. The galls grow in clusters on the limbs, and are in some cases much pressed out of shape. Perfectly

shaped galls resemble the galls of *Amphibolips spongifica*. Internally the galls are composed of an exceedingly brittle, structureless material, of a whitish or buffy-white colour that, to all appearances, shrinks away as the gall dries, so that there are large open spaces internally. Near the point of attachment on the inside of the gall is more or less of a resinous substance. The portion containing the larval cells, which are few in number, sometimes only one, is more dense, almost woody, in structure. The substance of these galls cuts about like a perfectly dry cracker.

This gall is separated readily from Mr. Bassett's *A. californicus* by the much less dense internal structure, in which are large open spaces.

Gall-flies.—The flies are of a very uniform walnut-brown colour throughout. So far as I can see, this colour alone separates the species from Bassett's *californicus*, which is very much lighter, a good cinnamon-brown. (These colours are given in accordance with Ridgway's Nomenclature of colours.) *Head:* Face finely rugose, more coarsely so near the mouth; vertex, genæ and occiput very finely rugose or granular in appearance, face rather closely set with very fine pubescence, occiput black, antennæ 15-jointed, 3rd joint 1½ times as long as the 4th, joints beyond the 4th gradually shorter, last 7 or 8 joints quite short and thicker than the preceding. *Thorax* very finely rugose and covered with pilose punctures, parapsidal grooves narrow and extending about half-way to the collar, median groove wanting; a slight groove on either side runs forward over the base of the wings; the two parallel lines from the collar are very distinct and extend fully half-way to the scutellum. Scutellum with two small foveæ fluted at the bottom, finely rugose, covered with a fine pubescence; pleuræ finely punctured and hairy. *Abdomen* polished, sides of 2nd segment near its base hairy, all the segments very minutely punctured. *Wings* slightly smoky, venation normal. *Feet* unicolorous with other parts, tarsal claws bidentate.

Length, 5 mm. Wings, 6 mm.

Described from 15 bred females. Galls were received August 26th, and the flies emerged between the 3rd and 22nd of November.

HOLCASPIS, Mayr.

H. maculipennis, n. sp.

The fragments of a globular leaf gall, about 1½ cm. in diameter, composed of a thin outer shell and a single larval cell held in place by radiating fibres, was sent me some time since by Prof. T. D. A. Cockerell,

who writes me that the gall was taken on the west slope of the Organ Mountains, in N. M., from a leaf of *Q. wrightii.*

Gall-fly.—A single female fly, in perfect condition, accompanied the gall, and may be described as follows :

Colour, rufous and black. *Head,* genæ, orbits, vertex and bases of mandibles rufous ; middle of face, occiput and tips of mandibles black ; face finely rugose, punctured and sparsely haired, the hairs rising from the punctures ; vertex and genæ more finely rugose or granular in appearance, palpi yellowish, antennæ rufous, 14-jointed, 3rd joint and last three joints blackish, 3rd joint distinctly longer than the 4th. *Thorax :* Prothorax rufous and finely rugose, mesothorax above blackish, streaked with rufous along the parapsidal grooves and along the lateral margins over the bases of the wings, otherwise black. The surface is finely rugose and set with punctures, moderately hairy, parapsidal grooves entire and very distinct, but not broad, median groove absent, the polished parallel lines extending back from the collar, and those outside the parapsidal grooves over the bases of the wings conspicuous ; scutellum rugose, rufous, except at base, where it is black, with shining basal groove crossed by numerous raised lines ; mesopleuræ rufous above and below, but black on median portion, punctured and moderately hairy. *Abdomen* black and shining, venter somewhat rufous, posterior margin of segments very oblique, sides of 2nd segment near base hairy. *Wings* long, nervures black, cells containing numerous black spots. This beautiful maculation of the wings, unlike any other species with which I am familiar, suggested the specific name for the species. *Feet* dark rufous, femora blackish, rather hairy.

Length, 3 mm. Wings, 4 mm.

DRYOPHANTA, Först.

D. glabra, n. sp.

Galls of this species were found abundant by the writer on leaves of *Quercus undulata* at Manitou, Colo., Sep. 30th, 1892. The fresh galls are straw-coloured, becoming brown with exposure. They are semi-globular, flattened on the side next the leaf, from 4 to 6 mm. in diameter, and situated along the midrib of a leaf, on either surface, but mostly below. A single larval cell in each lies next the leaf, and from it a mass of delicate fibres radiate to the outer shell, which is rather firm. The inner surface of this shell, in galls that have been protected from the weather, is of a deep pink colour. A number of the galls usually occur on the same leaf, and sometimes crowd one another, so they are far from globular.

Gall-fly.—With the exception of a little rufous on the joints of the feet and on the base of the mandibles, the colour is deep black. *Head* finely rugose, face with two parallel grooves and median ridge, antennæ 14-jointed, 3rd joint as long as 1st and 2nd or 4th and 5th united; ocelli well separated and inconspicuous. *Thorax* glabrous above, parapsidal grooves very distinct and extending to the collar, scutellum rugose, with basal groove, mesopleuræ smooth and glabrous beneath the wings. *Abdomen* shining, black, without sculpturing, the posterior margin of the 2nd segment quite oblique. *Wings* long, hyaline, beautifully iridescent, nervures slender. *Feet* black, tibiæ set with a very fine gray pile. Length, 2½ mm. Wings, 4 mm.

Described from one bred female.

(To be continued.)

CORRESPONDENCE.

LITHOPHANE ORIUNDA.

Sir,—Two localities may be mentioned additional to those given by Mr. Moffat in July (1893) number.

Mr. Grote has recorded Wisconsin as a habitat of *Oriunda*, and I can say that a single specimen was collected at Galena, Illinois, Sept. 26, 1875, from a sugared tree. THOMAS E. BEAN, Laggan, Alberta.

Sir,—I wish, on behalf of the Entomological Society of Ontario, to acknowlede the receipt of a contribution to the Society's collection of native Coleoptera, from Mr. A. H. Kilman, of Ridgeway. It consists of over a hundred and fifty species that were wanting in the Society's cabinets, all nicely mounted and in fine condition.

London, May 16th, 1894. J. ALSTON MOFFAT, Curator.

IS CŒNONYMPHA TYPHON SYNONYMOUS WITH C. INORNATA?

Sir,—Will American entomologists who are acquainted with the European forms of *Cœnonympha typhon*, especially with vars. *laidion*, Bork, and *isis*, Tett (probably identical), inform me whether *Cœnonympha inornata*, Edw., is a distinct species or is identical with these varieties? From the descriptions, I incline to the latter view, but an inspection of some specimens of the American insect in the British Museum (Natural History), not very first-rate ones by the way, rather lends countenance to the former. F. I. BUCKELL, M. B., 32 Canonbury Square, London N, England.

GLASS TUBES AS INCUBATORS.

Sir,—On June the 24th, 1893, I was obliged to go to my home in the High Sierras and beyond the Yosemite 22½ miles, as I had some moth eggs that I wanted to hatch and rear larvæ from. Before going I placed all the leaves that had eggs on them in a small glass jelly jar; being three days getting there, on account of the deep snow, I kept putting in fresh leaves every day for the young larvæ to feed on, as the eggs had begun to hatch before I started, and when I got home I had more dried and withered leaves than I bargained for, and in consequence lost some of the smaller larvæ that had hidden themselves. To prevent a recurrence of such loss, I thought of some glass tubes that were sent to me by Prof. Riley. I then separated all the leaves that had eggs on them, cut away all the superfluous dry parts of the leaf, and placed them all in one of these tubes, introducing a fresh leaf or part of one until a newly hatched larva made its appearance; I would then draw him out with the leaf and place him in another tube, or on a potted plant, thus ensuring correct data and better chances of observing its natural life-habits. This also ensures saftey to both eggs and the young larvæ, as new food can be introduced and the old extracted without annoying the larvæ.

JOHN B. LEMBERT, Yosemite, Cal.

THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The Association of Economic Entomologists will hold its annual meeting this year in Brooklyn, N. Y., August 14th and 15th, dates immediately preceding the meeting of the American Association for the Advancement of Science.

The fact that the meeting is to be held in Brooklyn is a sufficient guarantee of a large attendance and a meeting of more than usual interest. It is sincerely hoped that every member who can will be present, with papers to read, questions to ask and ideas to impart, that will make the meeting profitable and send all back to their posts of duty inspired to better work. C. P. GILLETTE, Sec'y., Fort Collins, Colo.

ASSEMBLING OF ATTACUS PROMETHEA.

Sir,—About 3 o'clock p.m., on the 11th of June, whilst hunting along the east side of a high picket fence, running north and south, with woods on the west, and a field on the east, my attention was arrested by the unusual movements of what I thought was a black butterfly. It was fluttering up and down the tall pickets, passing through between them and returning again, in a state of evident excitement. It left off, and flew close by me, when I saw that it was a male *promethea*. Meanwhile another had taken its place, and was going through similar movements. I at once inferred that a female must be in that vicinity. I moved onward, looking between the pickets, and I saw a female suspended to the lower end of a cocoon, out of which she had probably emerged that day. The cocoon was attached to the end of a slender twig, 12 or 14 inches from the fence, and about 4 feet from the ground.

I remained close by and watched the movements. There were at least four males on the wing. They would fly 20 or 30 feet along the fence, either way, and return. They never flew far afield, and I did not see that they ever entered the woods, whilst one or other of them was always fluttering about the spot, regardless of my presence. They seemed to tire themselves out in a main effort to locate the object of their search. I had watched for about fifteen minutes, when one came quietly along, passed between the pickets, fluttered hither and thither for an instant, then I saw its mate was found. During my observation the female was perfectly quiescent ; not a movement of wing or foot. There were three males still on the wing when I left.

Are we to consider *A. promethea* a day flyer ? or are all the Suturniidæ ready to pair at any hour of the twenty-four when circumstances are favourable ? It seems they do not require to fly at all to feed. The female may oviposit during the night.

I was greatly impressed during the observation by noticing how little, if at all, eye-sight was made use of. J. Alston Moffat.

Mailed August 1st.

The Canadian Entomologist.

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SOME INDIANA ACRIDIDÆ.—III.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

(Continued from page 223.)

Among the species of Pezotettix occuring in Indiana, there is one which I have never been able to place satisfactorily to myself. In my first paper on Indiana Acrididæ I called it *P. rotundipennis*, Scudder, upon the authority of Mr. S. H. Scudder, to whom specimens had been sent. Afterwards other specimens were sent to Prof. Lawrence Bruner, of Lincoln, Nebraska. He referred them doubtfully to *P. unicolor*, Thomas, stating that he had never seen *unicolor*, but that in his opinion they were not *rotundipennis*, as they differed materially from authenticated specimens of that locust in his collections from Florida.

I then let the matter rest for three years, when, finding no description agreeing with the insect, and having received nothing like it in exchange, I sent a number of specimens to Mr. A. P. Morse, of Wellesley, Mass., who carefully compared them with Mr. Scudder's types of *rotundipennis*, and pronounced them different. Mr. Scudder, after a second and more careful comparison, also pronounces them different. That they are not *unicolor* anyone who will carefully compare them with Thomas's description (Syn. Acrid., 151) or with the figure of that species (Pl. XLIV. Orth. of Wheeler Survey, 1875) will readily ascertain.

Taking the above facts into consideration, I believe the species to be new to science, and describe it herewith as follows :

PEZOTETTIX OBOVATIPENNIS sp. nov.

Pezotettix rotundipennis, Scudder, Blatchley, Can. Ent., XXIII., 1891, 80.

A Pezotettix, the ♂ of which is below the medium in size; the ♀ much larger, and quite robust. The tegmina are shorter than the pronotum, obovate in outline, a little longer than their greatest breadth, and reach but little beyond the first abdominal ring. In the ♀ they are separated

from each other on the dorsum by a space equal to three-fourths their greatest width; proportionally nearer in the ♂. Wings represented by a slender, oblong scale, which does not reach the tympanum.

Pronotum with both anterior and posterior margins subtruncate; the sides of the posterior lobe finely and densely punctate. The disk in ♂ with the lateral margins slightly divergent only on posterior half; in ♀ obviously divergent throughout their entire length, so that the posterior margin of disk is one-third wider than the anterior. Median carina distinct and equal throughout, the lateral carinæ present but indistinct, especially on the posterior lobe. Occiput, tumid, prominent. Vertex between the eyes broader than basal joint of antennæ in ♀, of equal breadth in ♂; the margins somewhat elevated above the slightly depressed centre and continuous with the margins of the frontal costa; the latter not sulcate in the ♀, slightly so above ocellus in ♂. Eyes prominent. Cerci of ♂ oblong, the basal third slightly broader than apical third, the middle narrower; the apical half but little curved inward, and but slightly excavated on its exterior face. The hind femora shorter than abdomen in ♀.

Colour of dried specimens: Above, dull grayish-brown or tan. A shining black band starts from the middle of posterior margin of each eye, and passes back, covering the upper half of lateral lobe of pronotum, then narrows and curves downward to coxa of middle leg. Below, this is bordered by an ivory-white band, which extends back from cheek and covers lower half of lateral lobe of pronotum, and then curves down between the front and middle coxa. The metapleurite is also ivory-white. Below, the general colour is a dirty yellowish-brown, with the lower face of the femora orange-yellow. The hind femora with their apices black, and with two indistinct blackish bars on the upper and outer faces. Hind tibiæ olive-green, annulate with whitish near the base, the spines black. Antennæ with the basal half reddish-brown, the apical half fuscous.

Measurements: Length of body, ♂, 16 mm., ♀, 24 mm.; of antennæ, ♂, 9 mm., ♀, 9.5 mm.; of tegmina, ♂, 2.7 mm., ♀, 4 mm.; of hind femora, ♂, 10 mm., ♀, 12.5 mm.; of hind tibiæ, ♂, 9 mm., ♀, 10.5 mm.

According to Morse, the following are the chief differences between *obovatipennis* and Mr. Scudder's *rotundipennis*: The hind femora of the latter are much stouter, and the sides of pronotum more divergent. The anal cerci of *obovatipennis* are flatter, more erect, and more nearly equal in breadth and thickness throughout. The width of supra-anal plate,

instead of being equal to the length, as in *rotundipennis*, is much narrower than the length. The greatest difference, however, is seen in the marginal apophyses of the segment preceding the anal plate. In *obovatipennis* these are arched, divergent, tapering, and of considerable length, with a deep and narrow notch on each side at base; while in *rotundipennis* they are fully developed as slight flattened triangular projections, shorter than broad, and with the base not notched.

No description is extant of the ♂ of *P. unicolor*, Thomas. The following characters, from the description of the ♀, will show that it is distinct from *obovatipennis*:

"Sides of pronotum parallel; carinæ equally distinct. Elytra half as long as abdomen, oblong-ovate. Hind femora passing the abdomen slightly. Colour, reddish brown throughout."

In general appearance *obovatipennis* resembles somewhat *Pez. manca*, Smith, but the ♀ of the former is much larger and more robust, with the disk of pronotum flatter, the sides more divergent, and the vertex broader. The tegmina are shorter, and with a much narrower base than those of *manca*, while the two species differ materially in colour.

Obovatipennis has been taken only in Vigo and Monroe counties. It reaches maturity about September 1st, and frequents, for the most part, high, dry, open woods, especially those in which beech and oak trees predominate. On the tops of the hills, in the coal district of Vigo Co., where the soil is a clay, and the herbaceous vegetation somewhat limited, it is the prevailing, and often only, representative of the family. In late October, if the season is dry, it is often found in company with *Chrysochraon viridis* and *Truxalis brevicornis* among the reeds and tall, rank grasses near the border of marshes, and as late as November 22nd has been noted enjoying the afternoon sunshine from a perch on the bottom plank or rail of a fence. The ♀'s are always much more numerous than the ♂'s, the ratio being about 8 to 1. Their larger, robust form renders them more clumsy, and hence more readily caught by the hand, the ♂'s being active leapers, and requiring quick movement on the part of the collector to effect their capture.

PEZOTETTIX OCCIDENTALIS, Bruner. (C. E., XXIII., 81.)

This is the *Pez. viola* of my first paper. When that was prepared, I considered *P. viola* and *P. occidentalis* as synonyms, but having received typical examples of the former from Prof. McNeill, I find them to be distinct.

Occidentalis is probably the least common species of the genus in the State, its general range being more western.

PAROXYA ATLANTICA, Scudder.

Paroxya atlantica, Scudder, Proc. Bost. Soc. Nat. Hist., XIX., 29.

My *Pezotettix hoosieri* (C. E., XXIV., 31) is doubtless a short-winged form of this species. Typical specimens of *atlantica* recently received from Mr. A. P. Morse differ only in being much duller in colour, and in having the tegmina reaching to end of abdomen. I have taken hundreds of the form *hoosieri* in this State, and in no one have the tegmina reached beyond the middle of abdomen, but wing length in orthoptera is a character of but little importance. In Mr. Scudder's original description of *atlantica*, the length of antennæ of ♂ is given as 10 mm., whereas, in the examples received from Mr. Morse, and in all taken in Indiana, they are fully 15 mm. in length.

I have found this species in but two localities in the State, viz.: about the margins of a large pond in Vigo County, and in a tamarack swamp in Fulton County. It is abundant in both places from August to October.

MELANOPLUS COLLINUS, Scudder. (C. E., XXIII., 99.)

For the past three years this has been a very common locust, reaching maturity in this vicinity about July 15th. Like the next species and *Pezotettix gracilis*, it delights to carry on its courtship among the leaves and branches of the iron weed, and hundreds may be taken there, many of them in copulation, as early as August 1st. While of about the same length, the females are much more robust than those of either *M. femur-rubrum* or *M. atlanis*, and the tegmina just reach the tip of or are a little shorter than the abdomen, instead of exceeding it as in those species. It doubtless occurs throughout Indiana, having been taken on the border of Lake Michigan, by Prof. Slick.

MELANOPLUS BIVITTATUS, Say. (C E., XXIII., 99.)

A common species in early summer, making its appearance about June 15th, and disappearing by mid-September.

Mr. Scudder considers *M. femoratus*, Burmeister, as distinct from this species, stating* that: "*bivittatus* has the hind tibiæ glaucous and yellow; in femoratus they are red; and the two species can be instantly distinguished by these peculiarities."

*Report Brit. N. A., Bound Survey, 1875, 343.

I have taken in Northern Indiana a glaucous-legged ♂ in copulation with a red-legged ♀, and also specimens in which the tibiæ were dark brown at base, greenish or glaucous in the middle, and red on the apical third. Specimens from New England, labeled *femoratus*, by Prof. Morse, differ in no wise from those from Indiana, called *bivittatus* by as able an authority as Prof. Lawrence Bruner. I am, therefore, constrained to believe that the two so called species are one and the same, Say's name having the priority.

MELANOPLUS GRISEUS, Thomas. (C. E., XXIV., 30.)

On September 24th, 1893, I found this locust to be quite common within the depths of a tamarack swamp in Fulton Co. While other *Acrididæ* were common up to the very border of the tamarack growth, this and two species of grouse locusts were the only ones found within this border. Several pairs were taken in coitu. It was not an active insect—usually, after one or two short leaps, squatting close to the earth, and seemingly depending upon the close similarity of its hues to the grayish lichens about it to avoid detection.

***

Other than the Tettiginæ, the earliest dates at which mature locusts have been taken in Vigo County are as follows:

Schistocerca americana, Drury, April 11th, 1893. Blown in by storm.*

Chortophaga viridifasciata, De Geer, Apr. 15th, 1894.

Arphia sulphurea, Fab., May 5, 1894.

Pezotettix viridulus, Walsh, May 11, 1894.

CANADIAN HYMENOPTERA—No. 6.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

This paper contains the descriptions of the remaining new species of Ichneumonidæ from Vancouver Island. For the generic determinations of Amorphota, Semiodes, Phobetes and Hypocryptus, representing genera not hitherto recognized in America, I am indebted to Mr. Ashmead.

Sub-family ICHNEUMONIDÆ.

TROGUS FLETCHERII, n. sp.

Female—Length, 14 mm. Black with brownish abdomen and ferruginous legs. Head black; face beneath antennæ, narrow orbits,

*See Psyche, June, 1893.

palpi and mandibles ferruginous; antennæ long, slender, brown above, the scape and basal half of flagellum beneath, ferruginous. Thorax black, coarsely punctured; two short lines on mesonotum; scutellum, posterior face of metathorax, tegulæ and sutures at base of wings, ferruginous; legs, including coxæ, entirely pale ferruginous, or rufo-testaceous; wings large, yellowish; nervures ferruginous, the costa darker. Abdomen as in *exesorius*, but more coarsely sculptured and of a brownish colour, the first segment and base of second a little paler.

Described from one of two ♀ specimens bred by Mr. Fletcher from the pupæ of a Vancouver Island papilio, and named after him in recognition of the fact that to his example and incentive I owe my interest in entomology.

Sub-family OPHIONINÆ.

ANGITIA AMERICANA, n. sp.

Female—Length, 6 mm. Black, with partly rufous legs. Head small, polished; face opaque, but scarcely sericeous; clypeus slightly swollen, with a small tubercle above; antennæ reaching to middle of abdomen, slender, filiform, 19-jointed, joints 3–5 gradually decreasing in length, remaining joints sub-equal, the apical joint flattened internally. Thorax longer than high; mesonotum and pleuræ polished, the former indistinctly punctulate; scutellum rather prominent; metathorax declivous, areolated and punctate, the central area fusiform and less coarsely sculptured; legs slender; base of all the coxæ, the trochanters and the tarsi piceous; femora and four anterior tibiæ rufous, the posterior tibiæ dusky; wings hyaline, iridescent; stigma sub-triangular and with the nervures brownish, areolet sub-pentagonal, the outer transverse nervure less distinct. Abdomen strongly compressed towards apex, piceous-black and highly polished; first segment long and slender, not expanded at tip, which is faintly sulcate, spiracles near apex; second and third segments long, the incisure almost invisible; remaining segments short and slightly retracted; ovipositor scarcely exserted.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

PYRACMON VANCOUVERENSIS, n. sp.

Female—Length, 10 mm. Black, legs and abdomen in part rufous. Head sub-quadrate, as wide as thorax, black, distinctly punctate; entire face below antennæ, interior orbits nearly to summit of eyes, cheeks below the eyes, mandibles except tips, palpi and scape of antennæ, yellow; a puncture at each upper angle of clypeus; antennæ long, slightly

swollen medially and attenuated apically. Thorax with rather coarse punctures; those of the pleuræ and pectus less closely placed, a conspicuous suboval polished spot beneath the insertion of wings; metathoracic areas well defined; legs rufous, including the coxæ, the anterior pair paler, with coxæ and trochanters yellow, the intermediate coxæ and trochanters also partly yellow; posterior tibiæ darker towards apex, and tarsi yellowish; wings hyaline, stigma and nervures dark brown; areolet triangular, the outer transverse nervure incomplete, only extending two-thirds the distance across the cell; if complete it would meet the second recurrent nervure; tegulæ pale. Abdomen rufous; the petiole, apex of segment three, and following segments above, black; ovipositor scarcely exserted.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

AMORPHOTA, n. sp.

A species referred to this genus is found in Mr. Taylor's collection, but it has been damaged, and the abdomen is now missing. It is therefore not advisable to describe the species until further material is received. There is a possibility of its having been described as a Limneria.

Sub-family TRYPHONINÆ.

SEMIODES SEMINIGER, n. sp.

Male—Length, 7.5 mm. Black, with legs and abdomen rufous. Head transverse, as wide as thorax, truncate posteriorly, rather coarsely punctured, a semi-circular carina below the antennæ; face and cheeks with yellowish pubescence; clypeus, mandibles, and scape beneath, rufous; antennæ nearly as long as body, moderately short at base and attenuated toward apex, about 30-jointed. Thorax entirely black, lobes of mesonotum distinct, the central more strongly punctured than the lateral; metathorax truncate posteriorly and strongly areolated; legs rather stout, the posterior femora slightly swollen; all bright rufous, including the coxæ; wings hyaline, tinged with yellowish, the nervures brownish, the areolet small, sub-pentagonal. Abdomen petiolate, entirely rufous except petiole; the first segment gradually expanded to apex, spiracles beyond the middle, two dorsal carinæ not reaching the apex; first segment and base of second sub-aciculated, the rest of abdomen polished and feebly punctulate.

Described from one ♂ specimen from Victoria, V.I. (Taylor.)

PHOBETES CANADENSIS, n. sp.

Female—Length, 7.5 mm. Mostly ferruginous. Head transverse, emarginate posteriorly, pale ferruginous; eyes black; a spot enclosing the ocelli, others at the base of antennæ and of the mandible, black; clypeus, mandibles, palpi and lower orbits yellowish; antennæ testaceous, nearly as long as body and rather stout, about 30-jointed. Thorax ferruginous, with the sutures more or less black; mesonotum rather prominent, indistinctly punctulate; scutellum convex; metathorax rounded posteriorly with a triangular central area enclosed by feeble carinæ; spiracles circular; legs rufous, all the tarsi paler; wings hyaline, tinged with yellowish, nervures brownish, no areolet. Abdomen broadly fusiform, ferruginous, the apical segments dusky; the first segment expanded beyond the spiracles, the dorsal carinæ almost obsolete; first and second segments sub-opaque, densely, finely punctulate; ovipositor scarcely exserted.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

HYPOCRYPTUS VANCOUVERENSIS, n. sp.

Male—Length, 6.5 mm. Black, with legs and middle of abdomen rufous. Head rather large, about twice as wide as long; vertex rounded and smooth, with fine punctuation; face below the antennæ with fine silvery pubescence; a spot on mandible and the palpi pale; antennæ stout, as long as head and thorax, black, with a yellow spot on scape beneath. Thorax entirely black; mesonotum closely, finely punctulate; pleuræ shining, indistinctly punctured; metathorax truncate posteriorly, strongly areolated and rugosely punctured; legs pale rufous, including coxæ; the four anterior trochanters yellowish; base of posterior coxæ, trochanters, tips of tibiæ and tarsi dusky; wings hyaline, nervures brownish, no areolet. Abdomen sub-petiolate, the first segment expanded posteriorly and with two sub-obsolete dorsal carinæ; segments one and two, with base of three, densely, opaquely punctulate; terminal segments polished and sparsely punctulate; first and apical segments black; two, three, four, except sides, and spot at base of five, rufous.

Described from one ♂ specimen from Victoria, V. I. (Taylor.)

Sub-family PIMPLINÆ.

EPHIALTES PACIFICUS, n. sp.

Female—Length, 20-25 mm., with ovipositor 40-50 mm. Black, legs rufous. Head polished; face with yellow pubescence, longer on clypeus;

palpi pale; antennæ slender, shorter than the abdomen. Thorax polished, with faint, sparse punctures on mesonotum and pectus; metathorax more coarsely punctate, feebly sulcate, the carinæ obsolete; tegulæ, with a brief line before, white; legs, including coxæ, rufous; posterior tibiæ and tarsi brownish; wings hyaline, iridescent, areolet sub-triangular. Abdomen slender, coarsely punctured; first segment carinate and sulcate only at base; segments 2-4 nearly twice as long as the first, which is shorter than fifth; apical third of segments 2-6 polished and transversely wrinkled; ovipositor rufous, twice as long as the abdomen; sheaths black, coarsely pubescent.

Male—Length, 8 mm. Differs from ♀ in being so much smaller and in having the legs somewhat paler. The anterior coxæ and trochanters, a spot on intermediate, and a small annulus at base of posterior tibiæ, white. Abdomen slender, segments of almost equal length.

Described from three ♀ and one ♂ specimens from Victoria, V. I. (Taylor.) The diminutive ♂ may belong to a different species, but it resembles this much more closely than it does any other species from British Columbia.

EPHIALTES VANCOUVERENSIS, n. sp.

Female—Length, 16 mm., with ovipositor 30 mm. Black, with rufous legs. Head finely punctulate; face sericeous, edge of clypeus and tips of mandibles rufous, palpi white; antennæ slender, 10 mm. long. Thorax finely sculptured; mesonotum finely, transversely rugulose, pleuræ densely punctate; lateral margin of prothorax yellow, with a highly polished groove above; metathorax closely punctured, feebly sulcate, carinæ obsolete; four anterior legs, including coxæ, yellowish; the intermediate with the femora and tibiæ externally rufous, and the tarsi brownish; posterior coxæ, trochanters and femora rufous, the tibiæ and tarsi black; wings hyaline, stigma and nervures black, areolet sub-triangular and subpetiolate. Abdomen finely sculptured and not tuberculate, except obsoletely on the basal segments; first slightly longer than second, not carinate or sulcate; three following segments of equal length, remaining segments gradually shorter and more finely punctulate; ovipositor as long as body, red, with black, finely pubescent, sheaths.

Described from one ♀ specimen from Victoria, V. I. (Taylor.)

ARENETRA PALLIPES, n. sp.

Male—Length, 10–12 mm. Black, with rufous legs. Head coarsely punctate; face and cheeks with very dense greyish pubescence; antennæ long and stout. Thorax more coarsely punctured, less pubescent, the pleuræ somewhat shining; all the coxæ and trochanters black, remainder of legs rufous, except posterior tibiæ, which are brownish; wings iridescent, sub-hyaline; stigma and nervures black. Abdomen finely sculptured, except the first segment, which is coarsely punctate at base and longitudinally aciculate at summit; lateral margins of segments 1–4 yellowish, apical margin of 2–6 narrowly white.

Described from five ♂ specimens from Victoria, V. I. (Taylor), dated February, March and April, 1886, and marked as "Very common, flying over garden at Cedar Hill."

COLEOPTERA TAKEN AT LAKE WORTH, FLORIDA.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Lake Worth is an elongated bay connected with the ocean, two and one-half miles from its northern end, and separated from it by a narrow elevated strip of land, varying in width from two hundred to nine hundred yards. Its length is about 20 miles, while in width it averages about thirteen hundred yards. The country adjacent to the west shore is largely in its primitive state—white sand overgrown with Saw Palmetto, scrub live oak and many other shrubs and vines, with occasionally some pines. The flora of the strip between the lake and the ocean is designated the semi-tropical forest by Mr. Schwarz, who has largely developed the coleopterous fauna of South-eastern Florida.

The part of the lake and the ocean beach where this collection was made is that north from the inlet in about lat. 25° 40', long. 80°, this part of the coast being the most eastern point of Florida, and almost touched by the Gulf stream. The collecting was done from February 18th to April 18th, a season of the year when most insects have disappeared in these warm regions, as is well known, just as they do at the north during the same months. Insects were, perhaps, scarcer than usual on account of the dryness of the season, there having been no rain from December till my departure, and the temperature by night mostly 70°, and that of midday 84°.

The whole number of species taken was 172; of these, eleven are undetermined, being either *aleocharini* or small things, only one of which is thought to be undescribed; of the others, 97 are very widely distributed; 40 (marked with a †) extend westward in the Gulf States, some of these as far as Texas; while only 25 (marked *), so far as known to the writer, have not occurred northward from Florida.

How many additional species exist in the territory collected over is conjectural, but certainly not more than 150, and these must be largely of species whose larvæ live in wood and fruits or seeds. The character of the soil, that of the flora and the long continued droughts militate against a coleopterous fauna prolific in species. This statement, however, applies only to this and similar localities.

† Cicindela tortuosa, Dej.
† media, Lec.
marginata, Fab.
Pasimachus marginatus, Fab.
Scarites subterraneus, Fab.
Dyschirius var.* falciger, Lec.
Ardistomis obliquata, Putz.
Bembidium contractum, Say.
† Tachys columbiensis, Limer.
nanus, Gyll.
† Loxandrus agilis, Dej.
Diplochila major, Lec.
* Platynus var. floridanus, Lec.
punctiformis, Say.
Galerita lecontei, Dej.
† Tetragonoderus intersectus, Germ.
Lebia marginicollis, Dej.
Brachinus cordicollis, Dej.
Chlaenius fuscicornis, Dej.
laticollis, Say.
Oodes americanus, Dej.
lecontei, Chaud.
Agonoderus infuscatus, Dej.
† Selenophorus fossulatus, Dej.
† Acupalpus rectangulus, Chaud.
Anisodactylus var. merula, Dej.
nitidipennis, Lec.
Copelatus glyphicus, Say.
Thermonectes basilaris, Harr.
* Cybister olivieri, Crotch.
Tropisternus glaber, Hbst.
† Hydrocharis castus, Say.
Philhydrus var. † simplex, Lec.
† Phœnonotum extriatum, Say.
? Homalota, 3 species.
Aleochara bimaculata, Grav.
nitida, Grav.
Creophilus maxillosus, Linn.
Staphylinus prælongus, Mann.
Belonuchus formosus, Grav. var.*
Philonthus hepaticus, Er.
alumnus, Er.
micans, Grav.
Actobius cinerascens, Grav.
Cafius bistriatus, Er.
Xantholinus, sp.
Lithocharis corticina.
Erchomus ventriculus, Say.
Bledius fumatus, Lec.
† punctatissimus, Lec.

basalis, Lec.
Coccinella sanguinea, Linn.
Chilocorus bivulnerus, Muls.
Exochomus marginipennis, Lec.
† Contristatus, Muls.
Hyperaspis signata, Oliv.
Silvanus rectus, Lec.
* Hemipeplus marginipennis, Lec.
* Mycetophagidæ.—New gen. and spec.
Dermestes nubilus, Say.
Hister parallelus, Say.
* Chelioxenis xerobatis, Hubbard.
Saprinus pennsylvanicus, Payk.
† placidus, Er.
* ferrugineus, Mars.
sp. not determined.
† Plegaderus barbelini, Mars.
Carpophilus pallipennis, Say.
mutillatus, Er.
Colastus semitectus, Say.
* Brachypeplus glaber, Lec.
Conotelus obscurus, Er.
† Epuræa luteola, Er.
sp. indetermined.
Stelidota geminata, Say.
octomaculata, Say.
strigosa, Gyll.
Omosita colon, Linn.
* Smicrips hypocoproides, Reit.
Tenebrioides corticalis, Mels.
Monotoma fulvipes, Mels.
Heterocerus var.—of substriatus, Mels.
collaris, Kies
Cyphon variabilis, Thunb.
† Lacon curtus, Lec.
Monocrepidius vespertinus, Fab.
auritus, Hbst.
† Ischiodontus ferreus, Lec.
† Orthostethus infuscatus, Germ.
Melanotus dubius, Lec.
sp. indetermined.
Buprestis lineata, Fab.
Chrysobothris floricola, Gory.
Brachys tessellata, Fab.
† Pyropyga minuta, Lec.
† Photinus consanguineus, Lec.
Chauliognathus marginatus, Fab.
Collops tricolor, Say.
Necrobia rufipes, Fab.
Sitodrepa panicea, Linn.
Cis, sp.
† Canthon nigricornis, Say.
Chœridium Lecontei, Harold.
Copris minutus, Drury.
* gopheri, Hubbard.
† Phanæus igneus, MacL.
Onthophagus tuberculifrons, Harold.
* Aphodius troglodytes, Hubbard.
Atænius strigatus, Say.
Trox suberosus, Fab.
scaber, Linn.
Strategus antaeus, Fab.
Cremastochilus harrisii, Kirby.
† Trichius texanus, Horn.
Elaphidion inerme, Newm.
unicolor, Rand.
† Plectromerus dentipes, Oliv.
† Callichroma splendidum, Lec.
Monohammus titillator, Fab.
* Leptostylus transversatus, Ches.
Lema trilineata, Oliv.
Chlamys plicata, Fab.
† Bassareus croceipennis, Lec.
Cryptocephalus binominis, Newm.

Pachybrachys, sp.
* Metachroma floridanum, Crotch.
Lina scripta, Fab.
Haltica ignita, Ill.
† Epitragus tomentosus, Lec.
† Polypleurus nitidus, Lec.
† Xylopinus saperdioides, Oliv.
Opatrinus notus, Say.
Blapstinus metallicus, Fab.
† Crypticus obsoletus, Say.
* Phaleria puncticeps, Lec.
† longula, Lec.
† picipes, Say.
Diaperis hydni, Fab.
?* Tachyporus, n.s.
† Platydema micans, Horn.
† Hymenorus densus, Lec.
* floridanus, Casey.
† Hyporhagus punctulatus, Thoms.
† Oxacis thoracica, Fab.
* Mecynotarsus elegans, Lec.
† Formicomus scitulus, Lec.
Anthicus difficilis, Lec.
† Anthicus pallens, Lec.
vicinis La.†
? vicinis var.
Attelabus analis, Ill.
* Pachnæus opalus, Oliv.
* distans, Horn.
* Artipus floridanus, Horn.
† Listronotus setosus, Lec.
† Macrops cryptops, Dietz.
Hylobius pales, Hbst.
Otidocephalus myrmex, Hbst.
* Notolomus basalis, Lec.
* Conotrachelus pusillus, Lec.
* Cryptorhynchus lutosus, Lec.
† oblongus, Lec.
† Rhyncophorus cruentatus, Fab.
Sphenophorus cariosus, Oliv.
sculptilis, Uhler.
placidus, Say.
Cossonus corticola, Say.
impressifrons, Bohm.
* Mesites rufipennis, Lec.
Xyleborus pubescens, Zimm.

Cicindela—*C. tortuosa* may probably be found active at all seasons, as it was taken on the Indian river, February 9th. It occurred abundantly on the borders of the lake, and also on moist, sandy places in the hummock. *C. marginata* appeared February 21st, and sparingly thereafter. *C. media* appeared on the beach March 1st, and became very abundant onward.

Carabidæ—*Tachys columbiensis* (undescribed) was seen March 1st, and became abundant on the lake shore, seemingly at home in salt water. *Platynus floridanus* was common on the coast after February 25th, and also on land under all kinds of rubbish where there was moisture. *Tetragonoderus intersectus* and *Selenophorus stigmosus* were taken in the garden patches under the dry fallen leaves of vegetables—as cabbage, beets, etc., on March 5th, and thereafter frequently.

Dytiscidæ—Hydrophilidæ.—The species listed were taken alive on the ocean side of the lake, and, with one exception, had probably fallen into it during a nocturnal flight from some fresh water lake on the main land. However, *Philhydrus simplex* was quite abundant under stones and sticks on the shores of the lake, and the night of the 10th of March being damp and sultry, a flight occurred, many coming into the house to the light. This form, though only .09 to .11 inch in length, is united with the northern *ochraceus*. *Gyrinidæ* were seen in abundance in a small lake on the main land.

Staphylinidæ—Belonuchus formosus, var. This variety was very abundant at all times in rotting oranges and under damp rubbish; it differs from the typical form in being altogether rufous, except the last two abdominal segments, black. No intermediate forms have been met with, and Mr. Schwarz states it occurs abundantly over all Florida.

Tachyporus, sp.—Two examples were taken under pine bark, greatly resembling my examples of *T. scitulus* from Sweden; the thorax and elytra are identical in coloration, but are not perceptibly punctured when viewed with a lens; the abdomen is more finely margined, and the length is only .06 to .07 inch. *Bledius punctatissimus*, and *B. basalis*.—The latter inhabits the wet sand bordering the lake in countless multitudes, and with it the former, but in much less abundance. *B. fumatus* was not seen till April 1st, and afterwards rarely. One of the types of this species was from Southern California.

Brachypeplus glaber—Five examples of this curious and still rare beetle were taken under the bark of a dead, standing pine, with *Cossonus impressifrons*. Previously I had one example taken near St. Augustine, and the types were from Enterprise, Florida; according to Mr. Schwarz, no others are known in North American collections.

Mycetophagidæ—Belonging to this family several examples were taken in April, of what may, perhaps, be new either generically or specifically, or both. They were sheltering in the folds of Palmetto leaves, on the blossoms of which Mr. Schwarz took them abundantly, both at Lake Worth, and also at Biscayne Bay, and also the larvæ under the bark of various trees; and he also states that it occurs in the West Indies, in Costa Rica, and was taken at the Chicago Exposition, in dried fruits (or seeds?) from Central America.

Monotoma fulvipes occurred abundantly in rotting oranges, with *Smicrips hypocoproides* and several small *Nitidulidæ.*

Scarabæidæ—Copris gopheri, Aphodiust roglodytes and the Histeride *Chelioxenis xerobatis* were taken 12 or 15 feet under ground, at a depth of about five feet, with the great sand-digging tortoise, *Gopherus polyphemus. Cremastochilus Harrisii.*—An example was taken April 4th, with a large ant. *Trichius texanus* occurred abundantly in the blossoms of Magnolia, April 10th.

Cerambycidæ—Plectromerus dentipes was taken, March 5th, by bush-beating, and the imago, pupæ and larvæ were found abundantly in the dead branches of a species of Schrankia, which produces the so-called "lucky bean," and which is popularly termed "wait a bit," which one will perforce certainly do on coming in contact with its retrose thorns. *Callichroma splendidum.*—Though I did not take this species, examples were seen which had occurred. These had probably bred in some of the swamps some distance inland.

Tenebrionidæ—Opatrinus notus was at all times excessively abundant, harbouring under boards, etc., on the dry sand. It breeds around the stem of the cabbage Palmetto, among the bases of the fallen leaves. *Crypticus obsoletus* was quite abundant in the same situations, and with it *Platydema nitens*, though less numerous. *Phaleria puncticeps* was rare on the ocean beach, while *P. longula* and *picipes* appeared about March 1st, and gradually became very abundant.

Hyporhagus punctatus—Several examples were taken under the bark of dead seagrape *(cocolobus)*, where they seemed to be in hibernation, though exposed to the sun with a midday temperature of 85°.

Anthicidæ—Mecynotarsus elegans was abundant in cultivated places on spots of sand hot enough to blister. It is difficult to capture on account of its swift, intricate gyrations. A minute ant inhabits the same places, and goes through the same movements. It may be a question whether the ant has learned these motions from the beetle or the beetle from the ant, but the advantage in one direction seems to be on the part of the beetle, as it is usually safe from beetle hunters till accidentally discovered. *Formicomus scitulus* was also abundant under boards and the dead leaves of garden vegetables where there was sand. *Anthicus, sp.*: Several examples were taken under dry cut grass with *Silvanus rectus.*

It is very close to the California *confinis*, but may be distinguished by the punctuation being generally finer. It may be a race of *vicinus* without banded elytra and smaller than the type.

Rhyncophoræ—Artipus floridanus, popularly known as the "rose bug," does not seem to hibernate at this season, if indeed it ever does; it exists in great numbers and does as much mischief as its northern namesake; though polyphagous, it seems to have a special fondness for citrus, particularly the lime, destroying the blossoms and young fruit, and likewise nipping the margins of the leaves, which become white, giving the tree a stunted, frosted appearance. On the main land this beetle feeds on the leaves of the live oak, and of such, many are of a brilliant verdigris-green colour, instead of the creamy white of those raised on *citrus*. *Macrops cryptops* and *Listronotus setosus* are found abundantly in the flowers of Sagittaria. *Notolomus basalis* abound from the middle of February till the various Palms are out of bloom. *Cryptorhynchus lutosus* breeds abundantly in the disks (rods) of an abnormal leguminous shrub, *Ecastophyllum brownei*. The most of the fruit ripens and falls from the bush before February, at which time the beetles escape, but the few belated disks found ripening, in nearly every instance contained a beetle in some stage. The determination of both beetle and plant is due to Mr. Schwarz, who had previously taken this insect at Biscayne Bay.

Mesites rufipennis—One example, ♂, was taken on the beach; the antennæ are inserted about the middle of the beak, which is coarsely punctured to the tip, and has the usual frontal fovea and deep groove extending in front of the insertion of the antennæ; on its under side is a deep broad groove extending from the tip to the gula. This species resembles closely immature examples of *M. subcylindricus*, but is more depressed, and the elytral intervals are less convex and more finely punctulate.

Scolytidæ—The examination of dead hardwood indicated that several species of this family were abundant in their season. The larvæ of one small species was observed in almost incredible numbers boring outwards in the bark of *Ficus aurea*, preparatory to pupation; they were so close together that the surface of the back could scarcely be seen. They were white, about .06 inch long, and too numerous to make traceable galleries under the bark, not being wood borers.

LIFE HISTORY OF PAPILIO ZOLICAON.

BY ALICE M. JORDAN, NAPA, CAL.

Egg.—On September 2nd, 1893, it was found back of Napa College Laboratory, laid singly on the stem of the flower of wild anise. Nearly spherical, base slightly indented, smooth, bluish-white with grayish shade on one side. Diameter, 1.245 mm. It hatched September 5th, bursting the shell in halves; the shell was white.

First larval stage.—Head rounded, black and shining. Body is largest near the head, with short black hairs rising from two rows of reddish-brown tubercles on segments 2, 3, 4, 5, 6, 9, 10, 11 and 12 on each side of the centre of the dorsal surface, one row near the centre, the other quite low on the side. On segments 7 and 8 are a number of irregular-shaped white spots. Coloured dark brown, scent organs bluish-white.

September	6	—	Diameter,	.65	mm.;	length,	3.40 mm.
"	7	"		.80	"	"	3.90 "
"	8	"		.89	"	"	4.38 "
"	9	"		.98	"	"	4.75 "
"	11	"		1.05	"	"	5.90 "
"	12	"		1.08	"	"	6.00 "
"	13	"		1.20	"	"	6.40 "
"	14	"		1.45	"	"	6.85 "
"	15	"		1.58	"	"	6.89 "
"	18	"		1.64	"	"	7.30 "
"	19	"		1.69	"	"	7.40 "
"	20	"		1.70	"	"	7.44 "

Second larval stage.—Head slightly retracted under joint 2; rounded, greenish with a black v-shaped line, the lower part of the v at the upper part of the head, and a short black line in centre of v and two on each side at base. The tubercles on segments 2, 3, 4, 5, 6, 9, 10, 11 and 12 are more hairy. The irregular white spots on segments 7 and 8 are somewhat larger. Both the dorsal and ventral sides are brown.

September	21	—	Diameter,	1.98	mm.;	length,	7.55 mm.
"	22	"		2.00	"	"	8.00 "
"	23	"		2.20	"	"	8.35 "
"	25	"		3.00	"	"	10.25 "
"	26	"		3.50	"	"	11.00 "
"	27	"		4.00	"	"	12.00 "
"	28	"		4.00	"	"	12.00 "

Third larval stage.—Head as before; tubercles on 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 are hairless and of a bright orange colour. The body is brown on dorsal side and brown mottled with green on ventral side. Scent organs yellow and slightly larger than before.

September	29	—Diameter,	4.10	mm.;	length,	18.	mm.
"	30	"	4.10	"	"	19.	"
"	31	"	4.30	"	"	20.	"
October	2	"	4.50	"	"	21.	"
"	3	"	6.00	"	"	21.	"
"	4	"	6.50	"	"	21.5	"

Fourth larval stage.—Head as before; body smooth, ventral side light green mottled with brown; dorsal side slightly yellowish on segment 2 round scent organs; from 2 to 12 the segments are in colour,—in the centre of each a black line in which are four yellow spots, two on each side; on each side of the black line there is a narrow bluish line; on the outside of these is a brown line, which is on the joint, and when the caterpillar is not crawling these brown lines are invisible. The 12th segment is bluish mottled with black. Scent organs are yellow.

October	5	—Diameter,	6.00	mm.;	length,	25.	mm.
"	6	"	6.50	"	"	26.	"
"	7	"	6.98	"	"	30.	"
"	8	"	7.50	"	"	35.	"
"	9	"	8.00	"	"	40.	"
"	10	"	9.00	"	"	40.	"
"	11	"	10.50	"	"	40.	"
"	12	"	10.50	"	"	43.	"

From the 12th of October until the 23rd, it remains the same size, and on the 23rd it attached the 12th segment to a stem of the food plant, spun a web until the web was between the 6th and 7th segments, drawing itself together as much as possible, it was ready to go into the next stage.

Chrysalis.—Cylindrical, the abdomen tapering, a slight depression between thorax and abdomen, a blunt trigonate thoracic prominence projecting forward parallel with a similar process over each eye; a slight lateral projection at base of wing-case and a row of subdorsal abdominal elevations, four of which are most distinct, also a row of openings lower down on each side. Colour light green mottled with light brown; wing-cases same colour, only streaked longitudinally instead of being mottled; the end of the thoracic projection is a dark brown; the similar processes over each eye are darker brown. A narrow band of dark brown extends the length of the body on both sides; from these bands extending along the base of the wing-cases are small elevations, seven of which are very distinct. October 25th: diameter, 7 mm.; length, 27 mm.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

IV. The Pleurostict Scarabaeidæ of Ontario and Quebec.

In this group we have in some of the genera a return to the cephalic and thoracic ornamentation by horns or tubercles in the males, as shown in the Coprophaga; however, none of the Canadian species would be thus misplaced by anyone having even a slight acquaintance with the family, as aside from this character the resemblance is slight. From some of the Melolonthinæ they are not so readily distinguished, except by the position of the spiracles, as defined in a previous article. The genera may be thus separted among themselves:

A. Claws of tarsi unequal in size.

b. Length not more than about ½ in. Antennæ 9-jointed.

Elytra conjointly very convex above, often more or less distinctly striate and punctate in rows ..... *Anomala.*

Elytra flat, distinctly sulcate ..... *Strigoderma.*

bb. Length greater, nearly or quite an inch. Antennæ 10-jointed.

Elytra immaculate ..... *Cotalpa.*

Elytra with black spots ..... *Pelidnota.*

AA. Claws of tarsi equal.

c. Very small (about 25 in.). Colour brown, with indistinct lighter marks, thorax distinctly channelled ..... *Valgus.*

cc. Larger (.40 to above an inch).

d. Elytra deeply sinuate behind the humeri ..... *Euphoria.*

dd. Elytra without more than a faint indication of this sinuation.

e. Thorax much narrower than elytra, often much narrowed at base.

f. Size small (.50 in. or less).

Colour uniform black ..... *Cremastochilus.*

Elytra luteous with black spots ..... *Gnorimus.*

Elytra rufotestaceous, or with transverse bands of that colour and white ..... *Trichius.*

ff. Size large (nearly an inch), colour uniform ..... *Osmoderma.*

ee. Thorax not narrowed at base beyond the effect produced by the rounding of the sides and about as wide as the elytra.

g. Head entirely unarmed, clypeus simple ..... *Cyclocephala.*

gg. Head with a low transverse carina anteriorly, clypeus always toothed.

Clypeus simply bidentate at tip.....*Ligyrus.*

Clypeus with an elevated tridentate process *before* the tip.....*Aphonus.*

ggg. Head with a long horn (♂) or a tuberele (♀) on the vertex .....*Xyloryctes.*

The placing of a specimen in position by means of the claws is easy, as the inequality in the inner and outer ones in the species comprised in group A is very marked. As most of the genera have but one species belonging within our faunal limits, they present no difficulty in the way of correct specific determination.

ANOMALA, Kœppe.

Two species of very variable colour and rather small size (.30 to .40 in.) are found here.

Thorax with distinct basal marginal line; colour variable, elytra usually with two transverse bands of dark spots...*undulata*, Mels.

Thorax without basal marginal line, colour black to yellow.....*lucicola*, Fabr.

STRIGODERMA, Burm.

One species (*S. arboricola*, F.) about .40 inch. in length, resembling Anomala in form, but the elytra are flat and distinctly sulcate. The thorax is dark brown with a metallic lustre, the outer and basal margins pale, the elytra are clay-coloured. It may be found on flowers during the day.

Fig. 28.

PELIDNOTA, MacLeay.

The "grape beetle," *Pelidnota punctata*, Linn., is our only representative. It is about an inch in length, brownish yellow, a black spot near the middle of the thoracic side margin, and three on each elytra (Fig. 28, *a* larva; *b* pupa; *c* beetle; *d* anal mark on larva; *e* antenna, and *f* leg of larva).

COTALPA, Burm.

Fig. 30.

One species, the "goldsmith beetle," *Cotalpa lanigera*, Linn. (Fig. 29, beetle; fig. 30, larva), is found in our fauna. It is about the size of the preceding species, and has the head and thorax golden, the elytra cream-coloured, with a slight bluish cast. Beneath metallic green, woolly.

Fig. 29.

CYCLOCEPHALA, Latr.

C. immaculata, Oliv., has once been reported by Mr. Moffat. It is a yellowish or reddish testaceous insect about half-an-inch in length, the head dark or even black. It bears some slight resemblance to certain *Lachnosterna*, but has shorter legs.

LIGYRUS, Burm.

The two beetles belonging to this genus differ greatly in size, and are otherwise easily separated. They are brownish in colour, heavier than *Lachnosterna* in appearance and with shorter legs. *Ligyrus relictus* breeds in old manure heaps.

Thorax without tubercle in front; length, .70-.90 in.....*relictus*, Say.
Thorax with a tubercle near the middle of anterior margin; length, .48-.67 in.....*gibbosus*, De G.

APHONUS, Lec.

A single species bearing considerable resemblance in size, form and colour to *Ligyrus gibbosus* is recorded. It may easily be distinguished, however, by the lack of the thoracic tubercle and by the clypeus bearing a tridentate process before the tip, whence the name *A. tridentatus*, Say.

XYLORYCTES, Hope.

To this genus belongs the large *X. satyrus*, Fabr., which attains a length of above an inch and is correspondingly heavy. The male has a long horn, curved backwards at tip, while the female has the head ornamented simply with a small tubercle on the vertex.

Fig. 31.

EUPHORIA, Burm.

Two species belong here, similar in shape, but easily separated. These are *E. inda*, Linn., (Fig. 31) and *E. fulgida*, Fabr. (Fig. 32), distinguished thus:

Fig. 32.

Thorax very hairy above, elytra luteous with

small, black spots.....*inda*, Linn.
Thorax naked and polished above, green with yellow margin, elytra brownish red, with green surface lustre in places...*fulgida*, Fabr.

CREMASTOCHILUS, Knoch.

The only recorded species is *C. harrisii*, Kirby, a rather elongate and flattened, black insect, .40 inch in length, the surface shining. The thorax has a very peculiar appearance, because of the angles being separated from the disk by rather deep impressions. The mentum is large and somewhat cupuliform, with a rather deep and broad notch behind. We figure it after Dr. Horn (Fig. 33).

Fig. 33.

OSMODERMA, Lep.

This genus includes two very large, dark coloured beetles, with the thorax much narrower than the elytra. They may be known apart thus:

Fig. 34.

Elytra nearly smooth, polished...*eremicola*, Knoch.
Elytra rough, scabrous, thorax with a rather deep channel.....*scabra*, Beauv.

Fig. 34 represents *O. scabra.*

GNORIMUS, Lep.

G. maculosus, Knoch, is the only species. It resembles *Trichius*, but the elytra are yellowish (luteous) with numerous black spots.

TRICHIUS, Fabr.

Three species are on the Canadian lists; all are to be found on flowers, especially wild rose and *Spiræa*, during the heat of the day, and fly readily when disturbed. The elytra are usually marked with transverse white bands. They may be tabulated as follows:

A. Elytra rufo-testaceous, without transverse bands or velvety lateral space.....*bibens*, Fabr.

AA. Elytra with white transverse bands and lateral velvety spaces.
Second and fourth elytral intervals moderately densely punctate.....*piger*, Fabr.
Second and fourth intervals very sparsely punctate...*affinis*, Gory.

All are only moderate-sized insects, with rounded thorax, narrower than the elytra, and very long legs.

VALGUS, Scriba.

A very small, brown species, *canaliculatus*, Fabr., (.25 inch), looking something like a diminutive *Osmoderma*, is our only representative. The thorax is distinctly channelled, the elytra very much flattened, and with indistinct yellowish or whitish markings across the middle and near the tip.

The following bibliography includes most of the more important papers in which the North American Scarabaeidæ have been treated in synoptic or more or less monographic form :

1856. Leconte, J. L. Synopsis of the Melolonthidæ of the U. S. Jour. Acad. Nat. Sci., Phil., Vol. III., Series II., pp. 225–288.

1856. Leconte. Notes on three genera of Scarabaeidæ, found in the U. S. Proc. A. N. S., Phil., Vol. VIII., pp. 19–25.

1867. Horn, Geo. H. Descriptions of new genera and species of Western Scarabaeidæ. Tr. Am. Ent. Soc., Vol. I., pp. 163–169.

1868. Horn. Geotrupes of Boreal America. Trans. Am. Ent. Soc., Vol. I., pp. 313–322.

1870. Horn. Note on some genera of Coprophagous Scarabaeidæ of the U. S. Trans. Am. Ent. Soc., Vol. III., pp. 42–51.

1870. Horn. Description of the species of Aphodius and Dialytes of the U. S. Trans. Am. Ent. Soc., Vol. III., pp. 110–134.

1871. Horn. Synopsis of the Aphodiini of the U. S. Trans. Am. Ent. Soc., Vol. III., pp. 284–297.

1871. Horn. Descriptions of new Coleoptera of the U. S., with notes on known species. Trans. Am. Ent. Soc., Vol. III., pp. 325–344.

1874. Leconte. Note on the genus Pleocoma, Lec. Trans. Am. Ent. Soc., Vol. V., pp. 81–84.

1874. Horn. Revision of the species of Trox of the U. S. Trans. Am. Ent. Soc., Vol. V., pp. 1–12.

1875. Horn. Synonymical notes and descriptions of new species of N. A. Coleoptera. Trans. Am. Ent. Soc., Vol. V., pp. 126–156.

1876. Horn. Revision of the U. S. species of Ochodæus and other genera of Scarabaeidæ. Trans. Am. Ent. Soc., Vol. V., pp. 177–197.

1878. Horn. Revision of the species of Listrochelus of the U. S. Trans. Am. Ent. Soc., Vol. VII., pp. 137–148.

1879. Horn. A monographic revision of the species of Cremastochilus of the U. S. Proc. Am. Phil. Soc., Vol., XVIII., pp. 382–397.

1879. Horn. Synopsis of the Euphoriæ of the U. S. Proc. Am. Phil. Soc., Vol. XVIII., pp. 397–408.

1880. Horn. Contributions to the Coleopterology of the U. S., No. 3. Trans. Am. Ent. Soc., Vol. VIII., pp. 139–154.

1881. Horn. Revision of the species of Polyphylla of the U. S. Trans. Am. Ent. Soc., Vol. IX., pp. 73–76.

1882. Horn. Notes on some little-known genera and species of Coleoptera. Trans. Am. Ent. Soc., Vol. X., pp. 113–126.

1884. Horn. Notes on the species of Anomala inhabiting the U. S. Trans. Am. Ent. Soc., Vol. XI., pp. 157–164

1885. Horn. Descriptions of some new N. A. Scarabaeidæ. Trans. Am. Ent. Soc., Vol. XII., pp. 117–128.

1885. Blanchard, Fred'k. On the species of Canthon and Phanæus of the U. S., with notes on other genera. Trans. Am. Ent. Soc., Vol. XII., pp. 163–172.

1887. Horn. A monograph of the Aphodiini inhabiting the U. S. Trans. Am. Ent. Soc., Vol. XIV., pp. 1–110.

1887. Horn. Revision of the species of Lachnosterna of America, north of Mexico. Trans. Am. Ent. Soc., Vol. XIV., pp. 209–296.

1888. Horn. Review of the species of Pleocoma, with a discussion of its systematic position in the Scarabaeidæ. Trans. Am. Ent. Soc., Vol. XV., pp. 1–18.

1888. Blanchard. Some account of our species of Geotrupes. Psyche, Vol. V., pp. 103–110.

1889. Casey, Thos. L. Coleopterological Notices, I. Ann. N. Y. Acad. Sci., V., pp. 40–198. (Table of Thyce.)

ERRATUM.—Page 229, fifth line from bottom, for "Club three-jointed" read "Club many-jointed."

Mailed September 6th.

The Canadian Entomologist.

VOL. XXVI. LONDON, OCTOBER, 1894. No. 10.

SIXTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

(ABSTRACT OF PROCEEDINGS BY THE ACTING SECRETARY.)

Morning Session—August 14, 1894.

The Association met at 10 a.m., in Room 12 of the Packer Institute, Brooklyn, N. Y., August 14th, 1894. The following officers and members were present:

President, L. O. Howard, Washington, D. C.; Vice-President, J. B. Smith, New Brunswick, N. J.; Acting Secretary, C. L. Marlatt, Washington, D. C. Messrs. William H. Ashmead, Washington, D. C.; Geo. F. Atkinson, Ithaca, N. Y.; Nathan Banks, Sea Cliff, N.Y.; D. W. Coquillett, Washington, D. C.; Geo. C. Davis, Agricultural College, Mich.; A. D. Hopkins, Morgantown, W. Va.; Geo. H. Hudson, Plattsburg, N. Y.; J. A. Lintner, Albany, N. Y.; V. H. Lowe, Jamaica, N. Y.; F. W. Raine, Morgantown, W. Va.; William Saunders, Ottawa, Canada; E. B. Southwick, Central Park, New York City; F. A. Sirrine, Jamaica, N. Y. There were also in attendance upon the meetings visitors and members of other scientific societies, the average attendance being twenty-five persons.

The meeting was called to order by the President, and in the absence of the Secretary, Mr. Gillette, Mr. C. L. Marlatt was elected secretary for the meeting.

The President, Mr. L. O. Howard, of Washington, D. C., delivered his annual address, which was entitled "The Rise and Present Condition of Official Economic Entomology," the scope of which is sufficiently explained by the title.

On motion of Dr. Lintner, the thanks of the Society were unanimously extended to the President for the admirable address presented.

A letter from the Secretary, Mr. Gillette, announced that he would be unable to attend the meeting.

The following active members were elected :

F. C. Test, C. E. Chambliss and H. G. Hubbard, all of the Department of Agriculture, Washington, D. C. ; Victor H. Lowe and F. A. Sirrine, of Jamaica, N. Y. ; and F. W. Raine, of Morgantown, W. Va.

The following persons were elected to foreign membership :

Walter W. Froggatt, Technological Museum, Sydney, N. S. W.

Charles Whitehead, Barming House, Maidstone, Kent, England.

Geo. H. Carpenter, Science and Art Museum, Dublin, Ireland.

Dr. Geza Horvath, Ministry of Agriculture, Buda Pesth, Austria.

Prof. A. Targioni-Tozzetti, R. Staz. d. Entom. Agric., Firenze. Italy.

Prof. A. Giard, 14 Rue Stanislas, Paris, France.

M. J. Danysz, Laboratoire de Parasitologie, Bourse de Commerce, Paris, France.

Dr. J. Ritzema Bos, Wageningen, Netherlands.

Mr. Sven Lampa, Entomologist, Dept. Agric., Stockholm, Sweden.

Dr. N. Cholodkowsky, Institute Forestier, St. Petersburg, Russia.

Dr. K. Lindemann, Landwirthschaftliche Akademie, Moscow, Russia.

Prof. A. Portschinsky, Bur. Entom., Ministère de l'Agriculture, St. Petersburg, Russia.

Mr. E. C. Reed, Banos de los Cauquenos, Chile.

Mr. J. B. Smith, New Brunswick, N. J., presented a paper on the use of bisulphide of carbon as an insecticide, in which he described a very considerable number of experiments in the use of this substance against the Melon Louse (*Aphis cucumeris*, Forbes), one of the most destructive pests in parts of New Jersey and a very difficult insect to deal with. He used the bisulphide by introducing it about the plants under wooden boxes or bowls, placing the bisulphide directly on the ground under the boxes and also in various receptacles. He concluded that, in melon fields at least, bisulphide of carbon could be used very effectively, and particularly in stamping out an invasion at its very outset, while the plants are still of small size.

The paper was discussed by various members, Mr. Southwick describing a combination of bisulphide with "Polysolve," which he had used in the form of an emulsion ; and Mr. Lintner suggesting the use of cloth coverings in place of the boxes employed by Mr. Smith. Mr. Galloway suggested the use of the protection cloth used by seedsmen, which is treated with oil and is practically air-tight. Mr. Howard referred to the original suggestion by Garman, of the use of a washtub, which

was thought to be very satisfactory for limited applications; and Mr. Smith and Mr. Saunders suggested the use of paper caps, similar to but smaller than those used by farmers for the protection of the hay crop. The subject of the relation of parasites to the control of the louse was also discussed, as well as the effect of the bisulphide on the plants themselves, also upon the germination of seeds, when employed for the eradication of grain pests, etc.

Afternoon Session—August 14, 1894.

The report of the committee appointed last year, on co-operation among station entomologists, was presented by Mr. Smith, in the absence of the chairman. The report covered the matter of concerted work upon the life-history of special insects and their geographical distribution, the selection of certain groups of species to be studied from year to year, co-operation in experimentation with insecticide machinery to avoid duplication, and suggestions in the matter of securing conjoint legislative action among the States. The report was accepted and ordered to be printed, so that opportunity might be afforded members to examine it, in order to be able to take definite action on its adoption at the meeting of 1895.

A letter from Miss Eleanor A. Ormerod was read by the President, in which she expressed her regret at being unable to be present at the meeting.

A paper by Mr. J. M. Aldrich, on spraying without a pump, was read in his absence by Mr. Davis. This paper described a scheme for the mechanical mixture of water and oil by the use of an ordinary Nixon Climax Nozzle, the combination of the water and oil being made in the nozzle itself.

In the next paper Mr. C. L. Marlatt gave a review of a number of experiments conducted during the present year with several standard insecticide mixtures, also a series of experiments testing certain of the more important new insecticides or substances which seem to be of value as insect destroyers recently put before the public. The work was mainly to determine (1) the best methods of treating scale insects; (2) the effect of various mixtures on trees and foliage, in both summer and winter applications; (3) to show the relative merits of the old insecticides compared with some of the newer ones, and (4) also the possibility of successfully combining insecticides and fungicides.

The paper was discussed by Messrs. Smith, Galloway and others.

Professor Galloway followed with a paper on various insecticide substances, with which he had been experimenting for a number of years past, many of them in lines which had not hitherto been worked to any extent. He discussed particularly the kerosene emulsion made with lime, with resin wash, and with Bordeaux mixture. He also described a new method of making resin wash, devised by one of his field agents in Florida, which, briefly, consisted in using purer caustic soda, causing a much more rapid formation of the resin soap. Various other mixtures of possible insecticide value were also suggested. The paper was accompanied by the exhibition of a large series of vials, illustrating the various mixtures and combinations described by the author. The communication was generally discussed, and the important point emphasized that none of the emulsions were as perfect or as permanent as the standard milk and soap emulsions in common use, although some of them are possibly of value for immediate application.

Mr. Webster's paper on "Spraying with Arsenites vs. Bees" was read, in the absence of the author, by the Secretary. The conclusions arrived at were that arsenic is always present in the abdomens of bees frequenting recently sprayed blossoms, and more or less of it reaches the honey sacs; and that bees are, therefore, liable to be poisoned by spraying the bloom of fruit trees. He claimed that his experiments were the first to show conclusively that actual poisoning does result to bees under the conditions mentioned.

In the discussion, Mr. Lintner stated that even in the event of actual harm resulting to the bees, the question is still an open one, for the reason that many noxious insects frequenting fruit blooms are also destroyed. The paper was further discussed by other members.

Mr. Southwick presented a paper on economic entomological work in the parks of New York City, in which he described the general character of the means employed to control destructive insects in the principal parks of New York; he also gave some notes on the occurrences of and damage due to the principal insect pests with which he had to contend. A general discussion of the paper followed, which was participated in by most of the members present.

Mr. Southwick followed with a second paper on the Wood Leopard Moth in the parks of New York, giving an historical account of the insect, its present status, the nature of the injury, the plants affected, and the means he had adopted to exterminate the pest. He stated that this is a

most difficult insect to control, and could only be reached by cutting off the affected limb. In the case of rare trees, he had adopted the plan of putting a little bisulphide of carbon in the larval burrow with an oil can, closing the entrance with putty, which had proved an effective remedy.

The paper was discussed by Messrs. Smith, Howard, and others.

In the absence of Prof. F. H. Snow, of Lawrence, Kansas, his paper was read by Mr. Victor H. Lowe. This communication, entitled "Work in Economic Entomology at the University of Kansas for the season of 1894," related particularly to the work with the Chinch Bug disease (*Sporotrichum globuliferum*), and a new alfalfa and wheat pest, which proved, on rearing, to be *Agrotis introferans*, Grote.

Mr. Smith reported that the same Noctuid had been found by Mr. Gillette to occur very abundantly the present year in Colorado, and Mr. Howard referred to the occurrence of the moth in enormous numbers in Nebraska.

Messrs. Ashmead, Lintner and Hopkins were appointed by the President a committee to nominate officers for the ensuing year.

Morning Session—August 15, 1894.

Mr. Hopkins presented notes on some discoveries and observations of the year in West Virginia. The paper dealt chiefly with wood-working insects, but also covered various garden pests, such as the Potato-scab Gnat, the Melon Plant-louse, etc. The paper was discussed at some length by Mr. Smith, Dr. Lintner, Mr. Raine, and others.

The President read a letter from Mr. Webster, stating that he was unable to be present, on account of being actively engaged in stamping out an attack of Fidia larvæ on grape roots, by the use of bisulphide of carbon.

Mr. Howard read a paper on the Eastern occurrences of the San José scale, in which he briefly reviewed the history of the insect in the United States, and showed that as a result of investigations during the winter of 1893–4, and the summer of 1894, the scale has been discovered in six localities in the Eastern United States outside of New Jersey, while in the latter State it occurs at many points. He traced the introduction to two nursery firms in the State of New Jersey, and one in Missouri. He detailed in full the remedial work which has been undertaken by the Division of Entomology of the U. S. Department of Agriculture in each of the six Eastern localities, and showed that by virtue of the active measures

which have been taken, the insect will probably be stamped out in the East by the close of the season.

The next paper was on the same subject, and discussion was therefore deferred.

Mr. Smith then read a paper on the San José scale in New Jersey. He stated that the scale had first come to him from a nursery in the State in March, 1892, but had not been recognized, and he did not become aware of the true nature of the insect until he received the special circular sent out by the U. S. Department of Agriculture early in 1894. He described his work in connection with the stamping out of the scale, and particularly the active and energetic steps taken by the owners of the infested nurseries, from which the scale had been exterminated on young stock. He reported sending out letters to all persons who had obtained stock from the nurseries in question, enclosing the circular from the Department of Agriculture referred to, and the examination of nearly 100 orchards in person. As a result of his observations and work, he felt confident that the scale would ultimately be completely stamped out. The introduction of the scale was shown to have been either in 1886 or 1887, on some plum stock claimed to be curculio-proof, obtained from the San José region in California. Other fruit trees imported from California were also shown to be very likely infested. He gave some facts in regard to the trees and varieties which are most liable to be infested, also some notes on remedies.

In the discussion of these two papers, Dr. Lintner considered the possibility of the introduction of the scale on fruit from California, and concluded that the likelihood of the scale, so introduced, obtaining a foothold was very slight.

Mr. Marlatt thought there was danger in placing too much confidence in the work or the statements of nurserymen as to the completeness of the eradication of the scale, pointing out the great difficulty of thorough extermination and the ease with which a random scale here and there could be overlooked. Mr. Banks referred to the publication in a New York paper of occurrences of the scale in two or three localities in New York, accompanied with the report of the adoption of active measures to stamp it out in each instance.

Afternoon Session—August 15, 1894.

In continuation of the discussion of the morning session, Mr. Smith

exhibited specimens of California pears, obtained in Brooklyn, which were covered with the San José scale in all stages of development.

Mr. Lintner exhibited an apple coming from Ottawa, Canada, handed to him by Mr. Saunders, which was covered with the scales of *Mytilaspis pomorum.*

Mr. Davis read a paper on Mealy Bugs and other lice. He gave a careful résumé of the life-history of the common Mealy Bug *(Dactylopius destructor)*, with detailed descriptions of the different stages; also some notes on *D. longifilis.* He also described a Coccus which he found on roots of clover, giving a general account of the habits and careful descriptions of the species. He also referred to *Eriococcus azaleæ* and other scale insects.

The paper was discussed by Messrs. Sirrine, Ashmead and Howard. Mr. Sirrine thought Mr. Davis's clover Coccus was the same as the one found by Professor Forbes on white clover, and named by him *Coccus trifolii*, Mr. Ashmead coinciding in this view, and Mr. Howard stating that the *Eriococcus azaleæ* was certainly not an introduced species from Belgium, as suggested by the author, since the species is not known in Europe, and Professor Comstock has found it on wild plants near Ithaca, indicating that it is undoubtedly a native species. He said also that the two old species of Dactylopius referred to by the author had been shown by Berlese to be synonymous with European species, and that their life-histories had been worked out by this author in great detail.

Mr. Marlatt read a paper on the Pear-tree Psylla in Maryland, in which he described the sudden occurrence of this Northern pear pest in two orchards on the eastern shore of Maryland, in very destructive numbers. The introduction of the species was shown to have been upon nursery stock from infested regions in New York, and the author was confident that the injury, while excessively severe for the moment, would not be of long duration, judging from the past history of the insect. A brief review of the life-history was given, with some notes on the natural enemies, notably a species of lace-wing fly *(Chrysopa oculata)*, the larva of which feeds voraciously on all stages of the Psylla; also various species of lady-birds, which are useful in a similar way. The life-history of the lace-wing fly was carefully worked out. Experiments with various insecticides on the eggs of the Psylla were detailed, and general recommendations for remedial work were given.

The paper was discussed by Messrs. Davis, Southwick, Lintner, and others, both Messrs. Southwick and Lintner reporting cases of sudden appearance of the Psylla, with subsequent equally sudden disappearance.

Mr. Smith deferred speaking until the reading of his own paper, which included a reference to the same insect, in which he said that the conditions described by Mr. Marlatt were identical with the conditions obtaining in localities in New Jersey, and that the source of the introduction was also the same.

Mr. Smith then read a paper, entitled "Notes of the Year in New Jersey," which was a summary of the important insects brought to the attention of the Entomologist during the present season. It contained references to occurrences of the Pear-tree Psylla, the Pear Blister-mite, the Pear Midge, a new pear pest in a species of Agrilus, probably *anxius*, the habits of this last insect being described at some length. The paper also considered the use of protective coverings for the trunks of trees as a means against the borer; invasions of cutworms; the Periodical Cicada; some potato insects; onion maggots; the remarkable mortality of the Clover-leaf Weevil larvæ, and the Potato-stalk Borer, *Trichobaris trinotatus*, which had been brought to his attention for the first time the present year, The paper was discussed by most of the members present.

Mr. Davis also presented a communication covering notes on special economic insects of the season in Michigan, referring particularly to the occurrence of *Diplotaxis Harperi* as a strawberry pest, a Dipteron raspberry girdler, *Adimonia clavicollis*, as a cherry-tree defoliator, *Notoxus anchora*, as feeding on fruit of cherry.

In the discussion, Mr. Hopkins stated that he had found the raspberry cane maggot, described by Mr. Davis, in the Alleghany Mountains in 1892, but did not rear the adult.

In the absence of Mr. Chittenden, his paper, entitled "Supplementary Notes on the Strawberry Weevil, its Habits and Remedies," was read by Mr. Southwick. The writer noted the occurrence of the Strawberry Weevil (*Anthonomus signatus*, Say.) in more or less injurious numbers in parts of Maryland, Virginia, Delaware, Pennsylvania and New Jersey in 1893 and 1894. Three new food-plants were discovered, the red-bud (*Cercis Canadensis*), the dewberry and raspberry, and the life-cycle from egg to adult was found to extend over a period of four weeks. The methods of oviposition and of severing stems are described. A table showing by States the destructive appearances of the insect from 1871 to

date is given. Under the head of remedies, the necessity of clean culture is pointed out, also the benefit that might be derived from early-blooming varieties of staminates, and of the red-bud tree as trap-crop. Kerosene emulsion and Paris green were found by experiment to be of service, but the latter gave the better results. Directions are given for the applications of these insecticides, three or four sprayings being advised, beginning two or three days before first bloom. The subject of covering beds is considered, and in conclusion the fruit grower is urged not to trust entirely to staminate varieties.

Mr. Smith said he had anticipated damage from this insect the present season, but so far as he had observed, it did not manifest itself in New Jersey.

In view of the lateness of the hour, the following papers were read by title only :

"Notes on the Insects of Northern Idaho," by J. M. Aldrich, Moscow, Idaho. This paper included a few notes on the principal pests of the "Pan-handle" district of Idaho, where the farming land is at an elevation of 700 to 3,500 feet, with a corresponding change in climate. The insects discussed were the Wheat Aphis, the Codling Moth, Bud Moth, Woolly Aphis, Pear-leaf Blister-mite and the San José scale, which latter the author stated was the most dreaded insect pest, and a considerable effort was being made to prevent its spread to new localities.

"Insects of the Year," by F. M. Webster, Wooster, Ohio. Mr. Webster's paper had particular reference to the occurrence of the larvæ of *Fidia viticida*, Walsh, in vineyards, which was the important insect manifestation of the year in Ohio. It also covered the Raspberry Agrilus, the strawberry Weevil, the Pear-tree Blister-beetle, joint worms, the Bean Leaf-beetle and other garden and small-fruit pests, such as the Grain Louse, Corn Bill-bug and a Thrips which is proving very destructive to onion crops. Other insects were also mentioned briefly.

"Notes from New Mexico," by T. D. A. Cockerell, Las Cruces, N. M. This paper covered numerous short notes on various insects observed in New Mexico, with a description of the climatic and other conditions characteristic of the more important natural districts of the State, and the bearing of these on the insect fauna.

"Some Experience with Mosquitoes," by Howard Evarts Weed, Agricultural College, Miss. This communication covered the result of certain experiments in the use of kerosene as a means of preventing the breeding

of mosquitoes in water reservoirs on the college campus. The use of kerosene was very satisfactory, and resulted in a very marked subsidence of the mosquito trouble. The author also reports that kerosene is a very good preventive to apply to the hands or face in the case of mosquito outbreaks.

The report of the committee on nominations was presented by Mr. Lintner, as follows :

President—J. B. Smith.

Vice-President—C. H. Fernald.

Secretary—C. L. Marlatt.

The report was unanimously adopted and the officers named duly elected. (By inadvertence no second vice-president was nominated or elected.) It was decided to follow the usual custom for the next meeting, and hold it on the two days preceding the meeting of the American Association for the Advancement of Science, and at the place decided upon for the next meeting of that Association. On motion, it was requested that the minutes be printed in full in "Insect Life."

After the reading and approval of the minutes of the entire session, Mr. Southwick moved that the thanks of the Association be tendered to the President and Secretary for the able and satisfactory manner in which they had discharged their respective duties.

The resolution was adopted.

The Association was then declared adjourned by the President for one year. C. L. Marlatt, Acting Secretary.

SEXUAL CHARACTERS IN SCOLYTIDÆ.

(A Preliminary Contribution.)

BY A. D. HOPKINS, ENTOMOLOGIST OF THE WEST VIRGINIA EXPERIMENT STATION.

(Read before section F. of A. A. A. S., Brooklyn, Aug. 20th, 1894.)

It appears that comparatively little is known regarding the external sexual characters of species in the family Scolytidæ. Indeed, the species of this family are among the most difficult of Coleoptera to study, or to properly identify, unless one has access to a large series of correctly named and classified examples. It is not so surprising, then, that more or less confusion exists with reference to descriptions of the sexes, and that numerous mistakes have been made in following the classifications and

sexual characters given by those Specialists whom we recognize as the best authority on the subject.

There is considerable difference of opinion among Specialists regarding the external sexual characters of species in the genus Platypus as based upon those given by Dr. Chapuse in his Monographie des Platypids. With a view of satisfying myself on this question, I dissected a number of alcoholic and dried examples of male and female *P. quadridentatus* and *P. compositus*. The results convinced me that the male and female characters given in the description of these two species are reversed.

The fact that descriptions of male and female Scolytids are based largely upon the characters given by Chapuse causes me to question the correctness of interpretations of the external sexual characters in other genera.

This led to the commencement of a systematic study of the sexual characters of all the species of which I had sufficient material. A number of male and female examples of *Xyloterus retusus*, *Xyloterus bivittatus*, *Xyleborus dispar*, and *Xyleborus obesus* were first dissected and a careful study of the male and female genitalia was made. I found that the male organ, while exhibiting remarkable differences in the species of the two genera, possesses certain peculiarities by which it can be readily recognized, even in dried specimens. Guided by this, I continued the investigation until male and female examples of thirty-seven species, representing seventeen genera, were dissected.

According to my interpretations, based upon the finding of the male genitalia in the species examined, the sexual characters, as given by Le Conte in Rhynchophora of America, North of Mexico, are wrong in ten species out of five genera, and correct in ten species out of nine genera. In fourteen species out of ten genera external sexual characters were determined, which were previously unknown to me, and most of them are probably new to science. In three species out of three genera, no distinctive or constant characters were observed by which the sexes could be designated.

While the external sexual characters appear to be constant with the species in some genera, in others no particular character is possessed by all of the species. In fact, what may be a good male or female character in one species will be reversed in another species of the same genus.

The greater development of the elytra and abdominal armatures is a

good male character in some species, but not in others. The frontal concavity is a good male character in some genera, but is reversed in others. The flattened or concave front fringed with long hairs is a good male character in some species, but is of no value in others, as we have found it either absent or reversed in species of the same genera. Size and colour appear to be of no value except in Xyleborus, where the male is, as far as known, very much smaller and usually paler than the female. Long hairs or bristles on the antennal club appear to be a good female character in Monarthrum and Gnathotrichus. The long silky hairs with curved points on the tibia and tarsus of male Xyloterus politus are rather a remarkable and unique sexual character. Frontal elevations, depressions, lines, channels and punctures are good sexual characters in some species, while the same thing is of no value in other species of the same genus. Thus, it will be seen that the external sexual characters are by no means constant among the species, and that it is not safe to conclude that because one species has a well-marked and known male or female external character, that other species belonging to the same genus will necessarily show the same character. It is my opinion that the sexes of no species of Scolytidæ should be characterized without previously dissecting one or more examples of both sexes.

The male genitalia are composed of certain horny parts, the form of some one or more of which is usually characteristic to the nearly related species of a genus, but a wide difference in the form of all of the parts exists in species belonging to different genera. To characterize the different forms by descriptions and drawings will require more time than I have, as yet, been able to devote to this subject. It appears to me, however, that further study in this line is necessary in order to approach anything like a perfect and natural classification of the Scolytidæ, and I hope to be able to contribute additional information upon this subject in the future.

Below, I submit a list of the species I have examined, and give the sexual characters as I have interpreted them. As previously stated, these conclusions are based upon the finding, in individuals of each species, a peculiar structure composed of numerous horny parts, which is evidently the male generative organ. The only room for doubt, in my mind, is in the bare possibility of an ovipositor composed of horny parts being possessed by the female of any of the species. The fact, however, of the numerous examples dissected, where the presence of the ova left no doubt

as to the sex, I failed to find anything approaching a horny ovipositor, leads me to believe that the genitalia possessing prominent horny parts are, among Scolytids, found only in the male

The descriptions referred to in the following list, unless otherwise noted, will be found in Rhynchophora of America, north of Mexico, by LeConte & Horn, 1886 :

PLATYPUS.

P. quadridentatus, Oliv. ♂ = description of ♀. ♀ new = description of ♂ *P. flavicornis*, except that the two large punctures each side of the anterior extremity of the short dorsal impressed line, referred to, are not punctures, but smooth, shining and slightly convex spaces.

P. compositus, Say. ♂ = description of ♀. ♀ = description of ♂.

CORTHYLUS.

C. punctatissimus, Zimm. ♂ = description of ♀. ♀ = description of ♀.

C. Columbianus, Hopk. ♂ = description of ♀. ♀ = description of ♂. Proceedings Entomological Society of Washington (not published), also Bulletin 36, W. Va. Expt. Station.

MONARTHRUM.

M. fasciatum, Say. ♂ = description of ♀. ♀ = description of ♂. Additional: ♂: front with coarse punctures; ♀: front with fine punctures, and with slight depression in the middle.

M. mali, Fitch. ♂ = description of ♀. ♀ = description of ♂ except in the long spine referred to, which is not present in any of my examples of either *fasciatum* or *mali*. The long hairs on the club, when adhering, as they often do, resemble a spine. The longest hairs rise from the base of the club on the side next to the head.

GNATHOTRICHUS.

G. retusus, Lec. ♂ = description of ♀. ♀ = description of ♂. Additional: ♂. Club of antennæ with a few short, stiff hairs. No long bristles. Head with a longitudinal elevation in front. ♀. Antennæ with a long bristle rising from the anterior edge of each joint of the funiculus, and the first and second joint of the club; also with a few long hairs, all curving upwards.

G. materiarius, Fitch. ♂ = description of ♀ (?). ♀ new. Antennæ with long hairs and bristles as in *retusus*. Head smooth and sparsely punctured. Additional: ♂. Head with elongated longitudinal elevation in front, ending in an acute point just above base of mandibles.

PITYOPHTHORUS.

P. minutissimus, Zimm. ♂ = description. ♀ = description.

P. confinis (?), Lec. ♂ = description of ♀. ♀ = description of ♂.

P. (?) *plagiatus*, Lec. ♂ = description of ♂ in synopsis of the Scolytidæ by Zimmerman, and of ♀ in Rhynchophora by LeConte. ♀ = description of ♀ (Zimm.) and of ♂ (LeConte).

XYLOTERUS.

X. retusus, Lec. ♂ = description. ♀ new. Head convex in front and roughened with minute granules, and with a small depression in the centre.

X. bivittatus, Kirby. ♂ and ♀ = descriptions.

X. (?) (*unicolor*, Eichh.) *politus*, Say. ♂ new. Hind tibia narrower. Anterior edge crooked and near the tip thickly clothed with long, silky hairs with incurving points. Tarsus with fine hairs curved at the points. ♀ new characters. Hind tibia broader. Anterior edge straight, with a few straight bristles. Tarsus with short, straight hairs.

The male of this species was unknown to Mr. Eichhoff when I examined his collection in 1892, as he remarked to me at the time that of the large series of examples he had examined from North America, he had failed to recognize a male. He also admitted that his *unicolor* was evidently the same as Say's *politus*.

The difference in the antennal club, as suggested by LeConte, and the remarkable male character, together with some other differences, demand, I think, that this species should have a distinct genus erected for it.

XYLEBORUS.

X. dispar, Fab. ♂ and ♀ = descriptions.

X. obesus, Lec. ♂ new (?). Length, 2 mm. Width, 1.4 mm.; similar in form to ♁ *X. dispar*, but smaller. Thorax does not project over the head. Head smooth. Elytra distinctly punctured, but not in rows, especially on the side. ♀ = description.

X. xylographus, Say. ♂ new (?). Length, 2 mm. Width, .6 mm. More cylindrical than ♂ of *X. pubescens*. Head punctured in front. Thorax projecting over the head, the anterior portion being slightly rugose, posterior portion smooth. Elytra shining, finely punctured, and with a few granules on the declivity. Body sparsely covered with long, fine hairs. ♀ = description.

I believe this species to be identical with *saxesenii*, Ratz. I can see

no difference in the examples collected here and those of *saxesenii* from France and Germany. Their galleries are also of the same character.

X. pubescens, Zimm. ♂ = description of ♂ *pubescens* and *X. perferans*. ♀ = description. Characters variable, and it is my belief that the names of this and a number of other forms of the genus will prove to be synonyms of *X. perferans*, Woll.*

X. fuscatus, Eichh. ♂ new. I do not see sufficient difference between this and the male of *X. pubescens* to distinguish them as separate species. ♀ = description. I think this will prove to be merely a form of *X. perferans*.

DRYOCŒTES.

D. autographus, Ratz. No distinctive external sexual characters were observed in the examples dissected.

D. Eichhoffi, n. sp. ♂. Head more convex in front and with only a few long hairs. ♀. Front slightly depressed and thickly covered with long yellow hairs.

This species resembles *D. autographus* in size and sculpture; the principal difference being found in the secondary sexual characters, which are rather prominent in this species, and obscure in the other. It was determined for me in 1891 by Mr. Eichhoff as a doubtful variety of *D. autographus*, but when I visited him in 1892, and called his attention to the different characters, he admitted that it was a new species, and told me to describe it as such. Therefore, I take pleasure in applying the name which must always be familar to specialists and students in Scolytidæ.

D. granicollis, Lec. ♂, with only a few hairs in front. ♀ with front thickly covered with long yellow hairs.

TOMICUS.

T. calligraphus, Germ. No distinctive external characters observed. The elytra armatures appear to be somewhat more prominent in the male than in the female, but this does not appear to be a reliable character.

T. cacographus, Lec. ♂ with depression in front. Declivity with slightly stronger armatures and longer hairs. ♀ with frontal depression either absent or obscure.

*Mr. Blandford, in a report on the destruction of beer casks in India, has recorded the same as his impression. London, 1893, p. 12.

T. pini, Harris. ♂ with frontal tubercle and elytral armatures more prominent. ♀ = description.

T. caelatus, Eichh. No distinctive external characters observed.

SCOLYTUS.

S. quadrispinosus, Say. ♂ and ♀ = descriptions.

S. muticus, Say. ♂ = description of ♀ (?). Head broad and flat in front and thickly fringed with long yellow hairs. Last abdominal segment with two tufts of long hair near the posterior margin. ♀ new. Head narrow, with impressed longitudinal line in front, and with only a few long hairs. Last abdominal segment without tufts of hairs.

S. rugulosus, Ratz. ♂ with head slightly flattened and broader than in ♀, the flat surface bearing a few long hairs. ♀—Head slightly more convex in front, narrower and without long hairs (at least in the examples I have examined).

CHRAMESUS.

C. icoriæ, Lec. ♂ and ♀ = descriptions.

POLYGRAPHUS.

P. rufipennis, Kirby. ♂ head with one and sometimes two acute tubercles in front. ♀ without acute tubercles in front.

PHLOEOTRIBUS.

P. frontalis, Oliv. ♂ and ♀ = descriptions.

HYLESINUS.

H. aculeatus, Say. ♂ = description. The narrow, smooth, longitudinal line referred to is present in both sexes. ♀: front more convex and less pubescent in front.

PHLOEOSINUS.

P. dentatus, Say. ♂ Declivity, with rows of rather prominent tubercles. ♀ Declivity, with rows of granules in place of tubercles.

DENDROCTONUS.

D. terebrans, Oliv. ♂ with only a few short hairs in front. ♀ with numerous longer hairs in front. This character is of little value, however, on account of the liability of the hairs to be rubbed off.

D. frontalis, Zimm. ♂ with frontal channel deeper, and the granulate punctures larger than in female. ♀ Front smoother and more convex.

HYLURGOPS.

H. glabratus, Zett. ♂ with slightly deeper transverse impressions in front, and a longer longitudinal elevated line above base of mandibles. ♀ with frontal transverse line present, but shorter in some individuals, and obsolete in others.

Morgantown, W. Va., August 10th, 1894.

PLATYSAMIA COLUMBIA.

BY J. ALSTON MOFFAT, LONDON, ONT.

During the winter of 1891–2, I received from Miss Morton, of Newburgh, N. Y., six cocoons of *P. columbia*, which she had reared from ova, received from one of her correspondents in Ann Arbor, Mich. They were the first cocoons of that moth I had seen. Their extremely small size as compared with *Cecropia*, their natty appearance and dark colour, relieved by flecks of white silk, was quite novel to me, so I frequently showed them to visitors. Amongst these was Mr. R. Elliot, of Plover Mills, one of our members, whose residence is about fifteen miles north-east of London, and whose name is well-known in ornithological circles, but who is rather a "naturalist" than a "specialist;" clear, calm and appreciative in his observations of nature, and thoroughly reliable in his statements. When he looked at the cocoons, he meditatively remarked: "I think I have seen something like that about our place. Indeed, I feel certain I have seen it, but I shall keep a look-out." On the 14th of April, 1894, I received from Mr. Elliot two *P. columbia* cocoons. They were attached to a branch of larch, on opposite sides of the same branch, and one about half its length in advance of the other. The son of a neighbour of Mr. Elliot found one on a tree growing at his house and showed it to Mr. Elliot, who saw it was what he was on the look-out for, so they searched the trees and found more.

The roughened exterior of the cocoons, their dark brown colour, with white markings, give them such a close resemblance to the bark of the branch, that, but for their prominence, they would be extremely difficult to detect, thus forcing on the observer the conviction that larch must be their natural food-plant. On the 3rd of May a male moth emerged from one of the cocoons, and on the 6th a female from the other. On the 5th of May Mr. Elliot gave me another cocoon, which gave forth its imago on the 13th, also a female. The male is three and a-half inches in expanse of wing; the females are four and four and a-quarter. Those from Miss Morton's cocoons are of corresponding dimensions.

Much doubt was entertained when this moth was first discovered, as to whether it was a "species" or a cross between two. This question was conclusively settled when Prof. Fernald published his description of its early stages (CAN. ENT., Vol. X., p. 43). Miss Morton has succeeded in pairing it with *Cecropia*, and she says the progeny "were all

barren, and quite different from either parent." When the Professor wrote his description, he was not confident that it was distinct from *Gloveri*. Since then Miss Morton has reared *Columbia* and *Gloveri* side by side, and she says: "The difference between their larvæ is marked in all their stages, whilst the cocoons also differ in size and texture." But she considers *Columbia* to be closer to *Gloveri* than to any other of the genus, and she has had large experience in rearing all of them. It is known by those who have handled them to be an easy thing to separate *Columbia* cocoons from all the other Platysamias, but there seems to be some difference of opinion as to what especially distinguishes the moth from *Cecropia*. That *Columbia* varies somewhat with the locality where found seems certain. The Quebec and Maine forms, as illustrated by Bowles and Strecker, do not strikingly resemble the Michigan specimens, which, Miss Morton says, are quite constant in general appearance. Prof. J. B. Smith states that all the *Columbias* that he has seen are very much alike. I sent a specimen from Miss Morton's cocoons to Dr. Brodie, of Toronto, who has given *Columbia* a good deal of attention, and he said it did not much resemble any *Columbia* he had; and if he had received it without data, he would have pronounced it a diminutive *Cecropia*. This to me was decidedly confusing, and set me wondering if there were no points of difference whereby to separate the two species unmistakably.

When taking a general survey of the two moths, the attention is at once arrested by the smaller size and darker colour of *Columbia*. But there are gradations in these. A very small *Cecropia* is at times obtained. The male from Mr. Elliot's cocoons is extremely dark, whilst a female received from Miss Morton does not perceptibly differ in general shading from some *Cecropias*. So, single specimens could give no certain indication from these differences.

With six authentic *Columbias* before me, and several fresh examples of *Cecropia*, I will take up that part of Prof. S. I. Smith's original description, where he contrasts the two species, and comment upon it in sections.

"This species differs materially from *S. cecropia*. The male has the antennæ, palpi, thorax and legs much darker." Correct, as a rule. "The short grey (or whitish) band on the hind part of the thorax is not found in *S. cecropia*." I have a male *Cecropia* with an indication of it, and in one of the *Columbias* it is not visible. "The discal spots of all the wings are white, instead of dull red with a white centre." In one of the *Columbias*, the spots are quite red. "The transverse bands of both pairs of wings

are white, instead of dull red bordered internally with white." Here, I think, we get the most distinguishing point of difference between the two moths. There is no symptom of red in the bands of *Columbia*. The "narrow, white, transverse band," which in some of the specimens would be better termed a line than a band, shades externally into the dark grey of the border, whilst internally it is edged with solid black, which merges into the dark brown of the middle area. This appears to me to be the most conspicuous and constant difference between the two species, and would of itself make it quite easy to separate the moths, regardless of size or depth of colouring. "It wants the broad white band so conspicuous on the anterior border of the secondaries of *S. cecropia*, and also the reddish tints and markings near the apices of the primaries." The band is not so clear a white, or so broad, but is edged with black, which is absent in *Cecropia*; the tints on the apices are a distinction of degree, and but a slight one at that.

"The female differs from that of *S. cecropia* in having the palpi, legs and abdominal rings dark brown, or almost black, instead of dull red." One of the *Columbias* is not distinguishable from *Cecropia* in that respect. "The discal spots of the primaries are linear, obscure and parallel to the transverse band, instead of broad, conspicuous and parallel to the costal border." The spots are more linear, but with a decided tendency toward lunate, thereby being about as much in line with the costal border as with the transverse band. And so far from being obscure, from the absence of red in them they are more conspicuous than in *Cecropia*. There is a male *Cecropia* before me that would answer that description better than any of the *Columbias*. "The discal spots of the secondaries are small and almost round, instead of large and somewhat triangular." No difference except in size, and the absence of red in the spots of *Columbia*. "As in the male, it has the white on the hind part of the thorax, and wants the white on the anterior border of the secondaries, and also the red on the apices of the primaries, on the discal spots, and on the transverse bands." What I have said on these parts of the male answers also for those of the female.

So, then, the only points that are left to me whereby to unmistakably separate *Columbia* from *Cecropia* are the narrow, dull white, transverse band edged internally with black, and the total absence of a red band. These might not separate it from *Gloveri* and *Ceanothi*. I am not familiar with those species.

FURTHER NOTES ON SCALE INSECTS (COCCIDÆ).

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

The numbering is continued from page 193.

(13.) *Tachardia cornuta*, n. sp.— ♀ scales crowded on the stems of the plant, lively red-brown in colour, smooth and rather shiny, subtranslucent; elevated so as to form in outline a triangle, the base of which is greater than either side viewed from one side, but with the sides greater than the base when the scale is viewed from one end. In a lateral view the two sides are about equal and meet each other at a right angle; all the other angles of the profile, whether taken from the side or from the end, are necessarily less than right angles.

A more minute inspection shows that the apex of the scale is not a simple pyramid, but consists of a horn or tooth inclined backwards, so that a small but distinct notch appears in the lateral outline on the posterior side. This horn gives the whole scale somewhat the shape of certain teeth of sharks.

Viewed from above, the scale is roughly oval in outline, but presents on each side a slight bulging, before and behind which is a groove or constriction.

Alt. 2, lat. 2, long. 2⅔ mm.

Boiled in caustic soda, the females give a fine bright carmine, like cochineal.

The young are elongate, bright crimson in colour.

Adult female circular in outline. The abdominal process appears to be formed of three segments; the basal one very large, about as long as the breadth of its base; the second much smaller, broader than long; the third or terminal quite small, abruptly truncate. From this terminal portion arise the anal hairs in two bundles of five each; these hairs are of considerable length.

The lateral tubes are elongate, of the peculiar structure usually seen in the genus. The glands are arranged in the tubes so that their proximal outline in mass, viewed laterally, forms a portion of a circle, not a pointed cone as in *T. melaleucæ*.

This lac-insect was discovered by Prof. E. O. Wooton, on a species of Compositæ growing on Little Mountain, on the occasion of a recent meeting of the New Mexico College Field Club. Little Mountain is in the Mesilla Valley of New Mexico, only a few miles from the Agricultural College. Unfortunately the plant was not in flower, and so cannot be

identified, but it resembles an *Artemisia*. It grows commonly on the mountains, but although I examined many specimens of it, I failed to find any of the scales, which appeared to be very locally distributed.

From holes in some of the scales, it is evident that the species is attacked by a parasite, but the latter has not been bred.

One other species of *Tachardia* or *Carteria* is known from the arid region, namely, *T. larreæ*, Comstock. I possess a specimen of this, kindly sent to me by Mr. Maskell, and from comparison with this, and a study of Comstock's description and figures, I concluded that my insect was distinct. But to make quite sure, I forwarded specimens to Washington to be compared with Comstock's types of *larreæ*, and Mr. L. O. Howard has very kindly replied as follows :—

"Your new species of *Carteria* differs from *C. larreæ*, Comstock, in the shorter, lateral excretory tubes, the shorter anal cone, and in the smaller number of pores in the four groups back of the anal cone. Each of these groups is composed of from 7 to 9 pores, while in *C. larreæ* they are composed of from 18 to 25 each."

It may be added, that *larreæ* also differs from *cornuta* in not being horned as described above.

The food-plant of *T. larreæ (Larrea)* grows abundantly in the vicinity of Little Mountain, but no *Tachardia* was found upon it.

(14.) *Orthezia annæ*, Ckll.—Prof. C. H. T. Townsend has kindly sent me particulars concerning an *Orthezia* which he found on *Chenopodium* at St. Joe, Arizona, July 20, 1892. I have no doubt that this is *O. annæ*, which was hitherto known only from specimens found on *Atriplex canescens* at Las Cruces, New Mexico. The species was not described until more than a year after Prof. Townsend's Arizona find.

(15.) *Phenacoccus helianthi*, Ckll.—This has so far only been recorded from Las Cruces, New Mexico. On August 25th, last year, I swept some specimens from herbage at El Paso, Texas, but was not able to find the plant they came off. The eggs and newly-hatched larvæ are pale orange.

The following insects prey on *P. helianthi* at Las Cruces :—

(a.) *Hyperaspis undulata*. Numerous, the larvæ covering themselves with white secretion and so simulating coccids. Imago shiny black, with a red spot on the disc of each elytron, and a broadly interrupted pale orange-tinted marginal stripe. Identified by Dr. Horn, who tells me that it has long been known as an enemy of aphides and coccids.

(b.) *Leucopis* (near *bellula*, Dr. Riley informs me). A small grey parasitic dipteron.

(c.) *Encyrtus*, sp. (fide Dr Riley). Reddish-ochreous.

(d.) *Tetrastichus*, sp. (fide Dr. Riley) was also bred, but it is a secondary parasite. The species is black with whitish legs and iridescent wings.

(16.) *Dactylopius solani*, n. sp.—♀ about 3 mm. long, sparsely covered with mealy secretion, but without lateral or caudal mealy processes. Colour pale yellowish. Antennæ of the type normal in the genus; 8-jointed, joint 8 elongate, about as long as 6+7; 2 a little shorter than 8, but longer than 3; 7 a little shorter than 3; 5 and 6 equal, a little shorter than 7; 4 shortest; 1 large and broad, about as long as 3; 8 with three whorls of hairs. Formula 82 (31) 7 (56) 4.

In another specimen, joint 8 was distinctly longer than 6+7. In this, also, joints 4, 5, 6 and 7 were about equal. 3 also may be subequal with 2.

Femur ¼ longer than tibia; tibia ⅓ longer than tarsus; trochanter with a long hair; femur stout, with a row of five short but strong bristles on its inner margin, and four (two pairs) on its outer or convex margin. Tibia with five strong bristles on its outer margin, and five or six on its inner margin. Tarsus with four bristles on its outer, and four on its inner margin. Claw stout, slightly curved. Tarsal knobbed hairs slender, with subobsolete knobs.

Mentum apparently 2-jointed. Derm with scattered hairs and round gland-orifices. Rostral loop very short.

Caudal tubercles as usual in the genus, distinct and fairly large, but not elongated, each bearing two hairs of the same size as those on the anogenital ring.

Anogenital ring with either the normal six hairs, or, in some examples, four hairs of the normal size and two small.

On tubers of potato (*Solanum tuberosum*), at the College Farm, Las Cruces, New Mexico, discovered by Mr. H. H. Griffin. Most of the specimens had been destroyed by parasites, when I received the material at the end of August.

Although we have as yet no definite information beyond that given above, it can hardly be doubted that the species lives naturally on the roots of native Solanaceæ, and has thence spread to the potato, which is not cultivated, except by way of experiment, at Las Cruces. It is ex-

tremely probable that the undescribed *Dactylopius* mentioned in Insect Life, iii., pp. 413, 419, as infesting the roots of tomato in New Mexico is the same. Another undescribed *Dactylopius* infests the roots of *Solanum melongena* in Jamaica, and although it certainly resembles *D. solani*, its identity with it cannot be affirmed until adult specimens have been examined. (Entom., 1893, p. 266.)

D. solani is rather an unsatisfactory species to describe, as it possesses just the necessary characters of the genus, neither more nor less. It is thus much like *D. simplex*, Ckll., which lives on leaves of *Pancratium* in Jamaica, but the similarity need not cause confusion, owing to the great difference of habitat. *D. affinis*, Maskell, which lives on potato-tubers in Australia, resembles *D. solani* considerably, but differs in the lateral filaments and in the proportions of the joints of the antennæ.

D. lavandulæ, Signoret, found on roots of *Lavandula* in Europe, differs in the proportions of the antennal joints; and *D. arecæ*, Mask., on roots of *Areca* in New Zealand, will at once be distinguished by the very short second joint of the antennæ. *D. poæ*, Mask., on roots of *Poa* in New Zealand, is quite different from *D. solani*.

At Las Cruces one finds on Compositæ an insect very similar indeed to *D. solani*, which I have described as *Phenacoccus helianthi*. It is distinguished without much trouble by the antennæ, which have 9 joints instead of 8, and by its above-ground habitat. As one contemplates these two insects, it is difficult not to think that we have in *D. solani* a representative of the old stock-form from which *Phenacoccus helianthi* sprung.

(17.) *Diaspis lanatus*, Morg. and Ckll.—This injurious species has, up to the present time, been recognized only in the West Indies and some of the eastern United States. I have now to report it from the other side of the world, namely, Ceylon. Mr. E. E. Green, of Punduloya, Ceylon, lately sent me specimens of what he considered a new species of *Diaspis*, "fatally abundant on cultivated geranium plants," and I can make nothing of it but *D. lanatus*. It similarly infests geraniums (pelargoniums) in Jamaica.

(18.) *Aspidiotus convexus*, Comstock, 1881.—This so-called species, which has been reported from California (Comstock) and New Mexico (Townsend), appears to have no real existence in the form described by its author. The New Mexican form, found on ash in Las Cruces, turns out to be *A. juglans-regiæ* var. *albus*, Ckll. I sent specimens of this to

the Dept. Agriculture, remarking at the same time that the relationship between *convexus* and *juglans-regiæ* needed investigation.

Mr. Pergande, when my letter was received, proceeded to look into the matter, arriving at the following remarkable results :—

MR. PERGANDE'S REPORT.

"Prepared a number of females of *A. juglans-regiæ* var. *albus*, and compared them with typical *juglans-regiæ*, but failed to find any structural differences between the two.

"The slides on which Comstock's types of *A. convexus* were mounted are not in our collection, and were probably taken to Ithaca. I prepared, therefore, 13 females, taken from twigs which had been labelled by Comstock *A. convexus*, 'type;' and also 6 females, which had been placed by Comstock in alcohol, while examining the species in California; but, when they were examined under the microscope, it was found that not one of them had any groups of pores, and that they agreed exactly with the description and figure of *A. rapax*.

"To be certain that they really are *rapax*, I prepared also a large number of females, taken from twigs which had been labelled by Comstock *A. rapax* 'type,' and found, after comparing those marked *rapax*, that all of them are absolutely identical.

"Comstock must have made a mistake while describing the two species; he had evidently by mistake taken hold of another species, while working on *rapax*. It is quite possible that his *convexus* is identical with either *juglans-regiæ* or *ancylus*. This point could be settled if Comstock would allow us to examine the slides." (Pergande).

Since *A. convexus* is thus founded on the scale of *rapax* + the ♀ insect of another species, the name must apparently drop. The name "*convexus*" refers to the convex scale of *rapax*, and should be placed in the synonymy of that species—which is itself, according to Mr. Morgan, of Oporto, a synonym of *A. camelliæ* (Boisd).

It is to be observed that in the Dep. Agr. Rep. for 1880 (1881), *A. convexus* is described on p. 295, *A. juglans-regiæ* on p. 300, and *A. rapax* on p. 307. Therefore, those who consider *rapax* distinct from *camelliæ* may have to consider whether the name *convexus*, which has priority of place, should not be preferred for it. On the other hand, if it turns out that *convexus*, apart from the scale, was *juglans-regiæ*, it again has priority of place, should any one care to use the name for a scale which is almost flat.

KENTUCKY BUTTERFLIES.

BY HATTIE H. WARNER, LEXINGTON, KENTUCKY.

The following list has for its foundation a collection belonging to the Experiment Station of the Kentucky State College. The diurnal Lepidoptera have not been made the object of special collecting by the Station entomologist, and doubtless a good many species will be added in the future :—

1. *Papilio ajax*, Linn. Common in all wooded regions throughout the State. High Bridge, Nortonville, Clay's Ferry, etc.

2. *Papilio philenor*, Linn. Frequent throughout the State. Bowling Green, Nortonville, Lexington, etc.

3. *Papilio asterias*, Fab. Frequent everywhere in the State.

4. *Papilio troilus*, Linn. Common locally. Specimens from Glasgow, Clay's Ferry, Fulton, etc.

5. *Papilio turnus*, Linn. Very common everywhere. Specimens from Providence, Lexington, Nortonville, Clay's Ferry, etc.

6. *Papilio cresphontes*, Cram. Rather rare. Lexington, Bowling Green.

7. *Pieris protodice*, Boisd. and Lec. Common some seasons, generally rare. Lexington.

8. *Pieris rapæ*, Linn. Very common everywhere.

9. *Nathalis iole*, Boisd. Very rare.

10. *Callidryas eubule*, Linn. Rather common locally in Western Kentucky.

11. *Colias cæsonia*, Stoll. Lexington. Not common.

12. *Colias philodice*, Godt. The most abundant butterfly of Kentucky. Occurs in large swarms about damp sand in the latter part of summer.

13. *Terias nicippe*, Cram. Common everywhere in lowlands. Lexington, Nicholasville, Bowling Green, High Bridge, etc.

14. *Terias lisa*, Boisd. and Lec. Found only occasionally. Specimens from Glasgow.

15. *Danais archippus*, Fab. Common everywhere.

16. *Argynnis diana*, Cram. Very rare. A specimen was collected by Prof. H. Garman, at East Cairo, several years ago.

17. *Argynnis cybele*, Fab. Common about thistles in summer.

18. *Euptoieta claudia*, Cram. Common in fall all over the State. Lexington, Bowling Green, East Hickman.

19. *Melitæa phaeton*, Drury. Moderately common in June. Pineville.

20. *Phyciodes nycteis*, Doubleday and Hewitson. Moderately common everywhere. Specimens from Lexington, Pineville, Brooklyn Bridge.

21. *Phyciodes tharos*, Drury. Very common all over Kentucky. Seen from May through the season.

22. *Grapta interrogationis*, Fab. One of the most abundant butterflies of Kentucky.

23. *Grapta comma*, Harr. Rather rare. Specimens from Lexington.

24. *Grapta progne*, Cram. Rather rare. Specimens from Clay's Ferry.

25. *Vanessa antiopa*, Linn. Not common, most often seen in the fall.

26. *Pyrameis atalanta*, Linn. Frequently seen throughout the State. Specimens from Lexington.

27. *Pyrameis huntera*, Fab. Rather common. Specimens from Lexington, East Hickman and Bryant.

28. *Pyrameis cardui*, Linn. Common everywhere.

29. *Junonia cœnia*, Hubn. Occasional in Eastern Kentucky. Common in western part of State, along the Ohio River. Specimens from Glasgow and Fulton.

30. *Limenitis ursula*, Fab. Frequently seen during the latter part of summer. Specimens from Glasgow, Lexington, Pineville, East Hickman.

31. *Limenitis disippus*, Godt. Not very common. Specimens from Lexington, Glasgow and Tyrone.

32. *Apatura celtis*, Boisd. and Lec. Common everywhere. Specimens from Lexington and Fulton.

33. *Apatura clyton*, Boisd. and Lec. Occasional. Specimens from Lexington, Fulton and Tyrone.

34. *Paphia troglodyta*, Fab. Occasional in Eastern Kentucky. Common locally in Western Kentucky. Found at Lexington, Hopkinsville and Glasgow Junction.

35. *Debis portlandia*, Fab. Moderately common in Western Kentucky. Specimens from Aden Springs and Fulton.

36. *Neonympha gemma*, Hubn. Occasionally seen. Specimens from Fulton.

37. *Neonympha eurytris*, Fab. Rather common in open woods. Specimens from Nortonville, Midland and High Bridge.

38. *Neonympha sosybius*, Fab. Common everywhere in woodland. Specimens from Fulton.

39. *Satyrus alope*, Fab. Common in mountains of Eastern Kentucky. Specimens from Midland.

40. *Libythea bachmani*, Kirtland. Occurs throughout the State. Common in Western Kentucky, along the Mississippi and Ohio Rivers.

41. *Thecla halesus*, Cram. Lexington.

42. *Thecla humuli*, Harr. Rather rare. Specimens from High Bridge and Fulton.

43. *Chrysophanus hypophlæas*, Boisd. Frequent. Specimens from Lexington.

44. *Lycæna pseudargiolus*, Boisd. and Lec. Frequently seen. Specimens from Lexington and Pineville.

45. *Lycæna comyntas*, Godt. Common everywhere. Specimens from Lexington and Pineville.

46. *Ancyloxypha numitor*, Fab. Abundant everywhere along streams.

47. *Pamphila zabulon*, Boisd. and Lec. Brooklyn Ferry and Lexington.

48. *Pamphila huron*, Edw. Common some seasons in Eastern Kentucky. Specimens from Lexington and Bowling Green.

49. *Pamphila otho*, Smith and Abbott. Rare; one specimen from Glasgow Junction.

50. *Pamphila peckius*, Kirby. Very common everywhere. Seen in June and July.

51. *Pamphila cernes*, Boisd. and Lec. Common throughout the State. Specimens from Lexington, Glasgow, etc.

52. *Pamphila verna*, Edw. Rare, only one specimen in the collection.

53. *Pyrgus tessellata*, Scudd. Common everywhere throughout the State.

54. *Nisoniades martialis*, Scudd. Rare, only one specimen, from Nortonville.

55. *Pholisora catullus*, Fab. Common throughout the State.

56. *Pholisora hayhurstii*, Edw. Not very common. Only one specimen, from Bryant, Kentucky.

57. *Eudamus pylades*, Scudd. Not very common, a single specimen from Brooklyn Bridge.

58. *Eudamus bathyllus*, Smith and Abbott. Rather rare. Specimens from Glasgow and Bowling Green.

59. *Eudamus lycidas*, Smith and Abbott. Rather rare. Specimens from Glasgow Junction.

60. *Eudamus tityrus*, Fab. Common throughout the State.

A FEW REMARKABLE VARIATIONS IN LEPIDOPTERA.

BY GEORGE A. EHRMANN, PITTSBURGH, PENN'A.

Papilio turnus, ♀, Linn.—I received a curious example of a ♀ *P. turnus*, which has the outer margin greatly produced towards the apex of the primaries; the secondaries are more rounded and not so elongate as in the typical form; and the black discal bars are broader and more suffused. The expanse is only 3¾ inches, thus giving the insect a very odd appearance. My specimen was taken in Westmoreland County, Pa. Dr. Holland has an example, taken in Coalburgh, W. Va., that agrees in every respect with mine.

P. turnus, dim, form *Glaucus*, Linn.—This singular specimen is of the *turnus-glaucus* form, but the right-hand primary is almost as light and boldly marked as the typical *turnus*. I have also an example that is as dark as the darkest forms of *glaucus* and has no trace of yellow in it except on the underside of the right-hand primary, where there are many large, light, yellow blotches, that seem to have been put there artificially. There is another in my collection that has little or no trace of yellow on the forewings, but the discal band of secondaries is nearly as boldly marked with yellow as in *turnus*.

P. asterias, Fabr.—Out of a batch of about forty larvæ that I succeeded in rearing, and carried through the winter of 1892–3, I obtained five fine examples, four males and one female, that have no pupil-spot in the ocellus. There were no two larvæ in this batch that were alike, even at the same stage of existence.

Leucarctia acræa, Drury.—♂. Same as the typical form, except that the black spots on the right-hand primary, between the median nervures, have blended into one another, thus forming three black bars. This curious example was caught flying around the electric lights of our city, in the latter part of June, 1893. The black bars are half-an-inch long, and give the moth a very singular appearance.

Leucarctia acræa, Drury, var. *Klagesii*, Ehrmann.—♂. Upper surface of primaries has no black spots whatever, except three small ones on the median portion of the costa, and six exceedingly minute black points on the outer margin. On the secondaries there is a faint black discal spot, and two on the outer margin, one near the apex and one near the inner angle. All these spots are almost obsolete, thus making this an interesting form, and giving it the beauty of having clear white primaries,

and almost immaculate orange secondaries. On the under surface of both pairs of wings the markings are the same as above, but the ground colour of the wings is much lighter than usual, and is of a lovely lemon yellow ; the abdomen, thorax, head, antennæ and legs are the same as in the typical form.

Of this form, I have seen several examples in various collections, and I believe that it is a sufficient variation to have at least a name of its own. I therefore claim the pleasure of dedicating this pretty form to the memory of my deceased friend, Frederick W. Klages, who was preparing for a second collecting trip to Jamaica, when he was taken ill and died.

PARTIAL PREPARATORY STAGES OF HEMILEUCA CALIFORNICA, WRIGHT.

BY G. H. FRENCH, CARBONDALE, ILL.

The eggs are sub-globular, between that and sub-quadrate, shaped much like *Luna* and its allies ; length, .06 inch ; width, .06 inch, by .05 inch in height; smooth, the apex flattened, but the base rounded. Colour, olive green; those on one side of the twig, red tinted. They were placed round a twig of food plant (willow) with one of the long ways across the twig. They were from California, and where deposited about the last of October. As they hatched the middle of the following April, this would give six months as the duration of this period.

Young Larva.—Length, .12 inch. Sub-cylindrical, largest at the anterior end. Body black, or, we might say, orange-black ; each joint with six fleshy, cylindrical tubercles, nearly as long as the diameter of the body, from each of which arise two white hairs. Head black ; venter, legs and anal segment orange. Duration of this period, 8 days.

After 1st moult.—Length, .16 inch. Shaped as before. Uniform brownish-black, the tubercles and all ; hairs grayish-white. Duration of this period, 11 days.

After 2nd moult.—Length, .25 inch. Of a uniform black, about the same shade as before ; the two dorsal rows of tubercles orange with black bases, those on the posterior part of the body with the black extending well up on the tubercle, two pale hairs for each tubercle.

During this period all died. Though I had several thousand of them, I failed to get any past the third moult. They were extremely gregarious in their feeding, huddling together on the food plant, and moving but little.

NOTES FROM MY DIARY, QUEBEC, 1893.

BY A. W. HANHAM, WINNIPEG, MAN.

On August 10th, I left by the 4.45 p.m. ferry for the Isle d'Orleans, which was reached about 5.30. A short walk uphill brought me to one of my favourite collecting grounds, and the remaining daylight was usefully spent looking for Coleoptera, a few good things being taken.

About dusk I visited a patch of the spreading Dog-bane (*Apocynum androsæmifolium*, Lin.), which was in bloom, growing at one end of a small clearing in the woods; a road ran alongside the fence at this end, on the other side of which was more wood. The evening was clear, with somewhat of a warm breeze. Here, in half-an-hour, I captured eight species of Plusia, over 30 specimens. I was kept busy netting and bottling my captures. Things were so numerous that several entomologists could have found a lively and profitable thirty minutes' occupation; unfortunately, I had to tear myself away at 8 o'clock, to catch the boat.

When I got home, I found the following to be the contents of my bottles: *Plusia putnami*, Grt., 4; *thyatiroides*, Gn., 1; *U-aureum*, Bdv., 1; *mortuorum*, Gn., 6; *viridisignata*, Grt., 1; *ampla*, Walk., 1. The balance consisted of *precationis*, Gn., and *simplex*, Gn. The only other noctuid taken at this blossom was *Drasteria erechtea*, Cram., rather common. I may add that before dusk I took a fine *Plusia bimaculata*, Steph., on the wing.

BOOK NOTICES.

RANDOM RECOLLECTIONS OF WOODLAND, FEN AND HILL; and WOODSIDE, BURNSIDE, HILLSIDE AND MARSH, by J. W. Tutt, Editor of the Entomologist's Record and Journal of Variation. London: Swan, Sonnenschein & Co.

The name of the author of these two volumes must be familiar to our readers, as an occcasional contributor to our pages, while he is widely known as a writer of much scientific repute on matters concerning the Lepidoptera. In these two books he has assumed a lighter and more popular role; his aim has been—to quote his own words—"to bring under the notice of the general public, in readable and untechnical language, a few of the interesting phenomena which are to be observed everywhere around us, by those who take the trouble to look for them, and to give such explanations of their causes as may easily be understood, even by those whose scientific knowledge is small." He has cer-

tainly carried out his design most successfully, and given to the world two very charming and interesting books on out-of-doors Natural History. Anyone, whether young or old, who takes any pleasure in the beauties of nature, and any interest in the varied world of animal and vegetable life, will read them with the greatest delight, and follow the author with unflagging interest, during his rambles over hill and dale, and by marsh and burn and fen. In the former work, more attention is paid to the habits and variations of insects, while the latter treats of any animal or plant that may be met with in expeditions to widely different localities. Amusing episodes and pretty bits of verse enliven the volumes, and many capital pictures render the later one still more attractive.

REPORT OF THE ENTOMOLOGICAL DEPARTMENT OF THE NEW JERSEY AGRICULTURAL COLLEGE EXPERIMENT STATION, by John B. Smith, Sc. D., for the year 1893.

It is obviously impossible to notice all the ever-welcome bulletins and reports that constantly flow from the various Experimental Stations throughout North America, for copies of which we are very grateful to their authors. We may, however, call attention to Dr. Smith's excellent departure from the ordinary report. After giving the usual general review of the season, and an account of the most important insect attacks of the year, he devotes a large portion of his work to a most useful and admirable account of the "Beneficial Insects," in all the different orders. It is clearly and plainly written, so as to be within the comprehension of non-entomologists, and is profusely illustrated with excellent figures, many of them being new productions by means of photography. It ought to be widely distributed, in order to teach the general public that a very large proportion of insects are not noxious, and should not be wantonly destroyed.

CORRESPONDENCE.

INSECTS AT LIGHT.

Sir,—That light is one of the greatest attractions to the Insect World has never been so forcibly demonstrated to me as this summer. In the eastern part of the City of Cleveland, and situated near the Garfield Memorial, are the immense car barns of the C. E. R. Co., one of the street railways of this city. One of these buildings, with a breadth of one hundred feet and a length of over three hundred feet, is painted white on

the inside. At night it is illuminated both inside and out with electric arc lights. The walls, I should judge, are about thirty feet in height. Situated as these buildings are, near the cemetery, some parts of which lie untouched by the hand of man, being in a truly primeval condition, you can see at once that the place is exceedingly favorable to the entomologist. It seems that these white walls, together with the electric lights, form a moth trap which no entomologist could improve. The ends of the building are, of course, left open. This place is a veritable fairyland for the entomologist. During a storm insects of all kinds will fly in, and are easily captured. Among the Lepidoptera which I have taken are the following: *Attacus luna*, *A. Cecropia*, *A. Polyphemus*, *A. Promethea*, *Eacles imperialis*, *Saturnia Io*, *Arctia acrea*; over twenty different species of Hawk moths, and many others too numerous to mention. As I am only collecting Lepidoptera, I have not paid much attention to the other orders of insects. The Coleoptera are also very abundant.

Before I close, I may speak of *Argynnis aphrodite*, which I never saw so common before. On going into a meadow a dozen will fly up at your approach, while they are over everything and everywhere. Never here have I seen a butterfly in such numbers.

GEO. L. LEE, Cleveland, Ohio.

ATTACUS PROMETHEA.

Sir,—Having noticed Mr. Moffat's communication regarding *Attacus promethea* in the August number, it occurs to me that the following may prove of interest. On June 10th, while in Milton, Mass., I placed two females in a box on the piazza for assembling. About 3 o'clock in the afternoon a male was observed flying around the house. He was captured, and a short time later another appeared. They kept coming at intervals until about half-past five, and after that none were seen. There were ten in all, of which number eight were perfect. On the next day, at about the same time, they began to come again, but very much more numerously. At the end of the afternoon, twenty-nine had been taken, besides a large number which were not collected, because of imperfections. The moths were not seen either night. The next day no more moths put in their appearance, and the females were removed. Besides this occasion, I have several times seen the male moths flying around, when there were no females in the vicinity. I have never seen the females fly by day, however, or the males except between three and six o'clock. It seems to me that *Promethea* is habitually a day flyer, but I have never seen any other of the Saturniidæ on the wing during the daytime. All the males which assembled showed the same apparent blindness which Mr. Moffat speaks of.

JAMES A. FIELD, Milton, Mass.

Mailed October 5th.

The Canadian Entomologist.

VOL. XXVI. LONDON, NOVEMBER, 1894. No. 11.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

V. The Coccinellidæ of Ontario and Quebec.

This family includes a moderate number of beetles, usually of compact, convex and often more or less hemispherical form, coloured as a rule in striking patterns of yellows or reds and black. In most cases the surface is glabrous, though in *Scymnus* and some less extensive genera it may be plainly pubescent. Technically, the family may be known by the clavate antennæ, the three-jointed tarsi with dilated second joint and the partially membranous dorsal abdominal segments; the ventral segments are free, the first usually with coxal lines, and the claws ordinarily appendiculate or toothed. It will, however, seldom be necessary to recur to these characters in the study of a limited fauna such as is presented by East Canada, as the facies is usually such as to render the fact of an insect belonging here unmistakable. Sexual characters are feeble and seldom used in specific or generic determinations.

The larvæ are common on leaves of plants, and may often be seen in numbers on twigs infested with aphides, which constitute the chief food of the more northern species, although *Epilachna borealis* (Fig. 35), which occurs farther to the south, is known to be phytophagous in habit. Most of the known North American larvæ of this family agree in being of somewhat elongate form, often quite spiny and usually spotted or banded in reds, black and yellows. They bear a resemblance to a minute alligator in shape, and are known under that name by children in some parts of the country. When full fed the larva attaches itself by the anal extremity to some convenient surface—the under side of a leaf or the bark of a tree in wild countries—and transforms to a pupa (Fig. 36—pupa of *Coccinella 9-notata*), displaying the characteristic gaudy colours before mentioned, the old larval skin adhering to the posterior extremity.

Fig. 35.

Fig. 36.

The genera are extremely difficult to tabulate in a

satisfactory form, and I have been unable to find easily seen characters in all cases—partly because of the extreme resemblance in form among certain genera, and partly on account of the wide variation in colour shown by a few species precluding much use of this in a table. In part, I have followed the "Classification," while in other places I have used more readily perceived characters, which, while not in themselves of true generic value, will nevertheless allow the species here treated to be properly placed. The interpretation of specific characters is, in general, after the "Revision of the Coccinellidæ of the United States," by Mr. Crotch, although he has not tabulated most of them. *Scymnus* is omitted for the present.

A word of caution is necessary to beginners. Some of the species are very closely allied, and often so variable in colour, especially as regards the greater or less development of the elytral spots, that they may prove extremely puzzling, and in order to avoid mistakes the tables and descriptions, which have been made fuller than in preceding papers of this series, should be carefully studied. The considerable number of figures offered should also prove an aid to accurate work.

The species known from our region may be placed in their approximate genera by use of the following key:

A. Body pubescent.

Antennæ reaching base of thorax; body oblong-oval... *Coccidula.*

Antennæ scarcely as long as the head; body nearly hemispherical..... *Scymnus.*

AA. Body glabrous, base of antennæ covered by a frontal plate, thorax very small; upper surface black, elytra each with one red spot..... *Chilocorus.*

AAA. Body glabrous, base of antennæ exposed, thorax of moderate size.

b. Form oblong-oval or elongate, ventral lines absent or nearly so.

c. Elytra with sutural and discoidal black stripe..... *Næmia.*

cc. Elytra spotted.

d. Thorax distinctly margined at base. ..... *Megilla.*

dd. Thorax not margined at base.

Small (.13 in.). Elytra each with eight spots,* sometimes confluent..... *Anisosticta.*

Larger (.20—.30 in.). Elytra with not more than six spots* on each. ..... *Hippodamia.*

*The common sutural spots excluded.

bb. Form usually rounded and much more convex; metasternal and ventral coxal lines distinct.

e. Antennæ longer (sometimes only slightly so) than the head; form looser, less contractile; colour above usually pale with dark markings.

f. Size small (.08 to .10 in.).....*Psyllobora.*

ff. Larger (.16 to .38 in.).

g. Antennæ only slightly longer than the head, elytral epipleuræ not extending to tip.

Lines on first ventral angulate externally.....*Coccinella.*

Lines on first ventral semicircular, complete .....*Adalia.*

Lines on first ventral incomplete externally.....*Harmonia.*

gg. Antennæ longer, extending at least to middle of prothorax; epipleuræ entire.

Claws bifid, body oval, more convex.....*Mysia.*

Claws toothed, body rounded in outline, less convex.....*Anatis.*

ee. Antennæ extremely short, about as long as the front; body compact, strongly retractile; colour above black, with yellow or red markings.

Anterior tibiæ with a strong spine on the outer edge, elytral spots more numerous.*Brachyacantha.*

Anterior tibiæ simple, elytral spots fewer in number.....*Hyperaspis.*

ANISOSTICTA, Duponchel.

A. strigata, Thunb., which represents the above genus in the Canadian fauna, is a small ovate or somewhat elongate insect (.13 in.), black beneath excepting the sides and tip of the abdomen, which, with the legs and antennæ, are yellow. Above, the head is yellow anteriorly, the thorax yellow, with two triangular black spots, the apices of the triangles being applied to the base. These spots are sometimes irregularly v-shaped, or the outer limb of the v may even be separated as a spot. Elytra yellowish, with a common bilobed spot on the scutellar region, and usually eight others on each, black; these spots may, however, be confluent in a varying degree, so as to form a less number of larger size.

NÆMIA, Muls.

To this genus belongs *N. episcopalis*, Kirby, a small species (.15 in.) of more than usually elongate and parallel form, black beneath, with the legs and sides of the abdomen yellow. Above, the head and prothorax are black with yellow stripes, the elytra yellow with a narrow common black sutural vitta, and on each a broader discoidal one; none of these reach the apex.

MEGILLA, Muls.

The well-known *M. maculata*, DeGeer, is of an oval, not very convex form, black beneath, the prosternum and a row of triangular lateral abdominal spots reddish. Above, reddish, with large black spots as follows :—Two large black sub-triangular on the prothorax, one diamond-shaped on the scutellar region of the elytra, one transversely elliptical on the suture about three-fourths to tip; each elytron has in addition four spots (the second the largest) arranged longitudinally near the external edge. Legs black, head black with a triangular frontal spot prolonged on to both sides at the broad end. Length, .20 to .22 in. (Fig. 37.)

Fig. 37.

HIPPODAMIA, Muls.

The species are rather numerous and vary to a considerable extent in the size of the elytral black spots. The thorax has a pale border and often two white dashes on the disk.

A. Tibiæ black.

b. Thoracic border sinuate or interrupted. Discal marks absent, or nearly so.

Basal elytral spots large, usually connected so as to form a transverse band. Length, .25–.27 in. . . *5-signata*, Kirby.

Basal elytral spots small or wanting, .28–.30 in. *Lecontei*, Muls.

bb. Thoracic border nearly uniform, disk with two white dashes. Elytral spots small, never united, .18–.20 in. . . *convergens*, Guer.

AA. Tibiæ pale.

Thorax with quadrate yellow spot at middle of base, .16–.20 in. . . . . *parenthesis*, Say.

Thorax without spot at base, .20–.24 in. . . . *13-punctata*, Linn.

Fig. 38 is a diagram of *Hippodamia 5-signata*; Fig. 39—A the larva, B the pupa, and C the imago of *H. convergens*; Fig. 40 *H. parenthesis*; Fig. 41 *H. 13-punctata*.

Fig. 38.

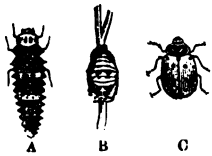

Fig. 39.

Fig. 40.

Fig. 41.

COCCINELLA, Linn.

A number of species of very convex form constitute this genus; they vary, as do those of *Hippodamia*, in the extent of the black markings, but may be separated thus:—

A. Elytra red, immaculate. White margin of thorax with three branches..... *sanguinea*, Linn.

AA. Elytra reddish or yellowish with black markings.

b. Thorax with anterior margin white.

Elytra with three black transverse fasciæ, sometimes reduced or partially divided, .22 in..... *trifasciata*, Linn.

Elytra with a common scutellar, and each with four other spots, black, the two anterior smaller, .26–.30. *9-notata*, Hbst.

bb. Thorax with anterior angles only white.

c. Elytra strongly punctulate, shining; thorax with anterior angles triangularly white. Elytra each with a triangular subapical black spot and a common black sub-basal fascia tridentate anteriorly, .19 in..... *tricuspis*, Kby.

cc. Elytra alutaceous, obsoletely punctulate. Thorax with a quadrate white spot on the anterior angles above.

Anterior thoracic angles only narrowly white beneath. Sub-basal spots of elytra usually united into a common fascia, .28–.30 in..... *transversoguttata*, Fabr.

Anterior thoracic angles as broadly white beneath as above. Elytra without sub-basal band, usually with an oblique medial fascia, a scutellar spot and a subapical spot on each, .28–.30 in.... *monticola*, Muls.

Of the above species, *C. tricuspis* is unknown to me in nature. Figures are given of *C. sanguinea*, Fig. 42; *C. trifasciata*, Fig. 43; *C. 9-notata*, Fig. 44, and its larva, Fig. 45, and pupa, Fig. 36; *C. transversoguttata*, Fig. 46; and *C. monticola*, Fig. 47.

Fig. 42.

Fig. 43.

Fig. 44.

Fig. 45.

Fig. 46.

Fig. 47.

ADALIA, Muls.

Two species are found in the Canadian lists ; they are similar in outline to *Coccinella*, but less convex. Being very variable in colour, they are likely to make trouble, but may be separated thus :—

Elytra uniform yellowish red or with transverse fasciæ of small black spots in varying number, .18 in..... ....*frigida*, Schn.

Elytra yellowish-red with a rather large discoidal black spot, .19 in..... ....*bipunctata*, Linn.

Elytra black, humeral angles, or entire basal region, and a smaller post-median spot red..... ....var. *humeralis*, Say.

HARMONIA, Muls.

The species of Harmonia are very troublesome to define by description, but are comparatively easily recognized after a short acquaintance. *H. 12-maculata* is easily known by its convex form and resemblance in coloration to *Megilla maculata*, while the oblong-oval form and peculiar markings (see Fig. 48) of *H. picta* render the more typical specimens easily known. *H. 14-guttata*, while of somewhat the same form as *21-maculata*, may be easily separated from it by the dark ground colour with lighter markings. The differences may be stated, then, as follows :—

Fig. 48.

Elytra testaceous or pinkish, with large black spots ; one common scutellar, one common at about three-fourths, and, on each elytron, one humeral, two medial, one post-medial, and one triangular apical. Thorax with two very large black spots. Form hemispherical, .22 in..... ....*12-maculata*, Gebl.

Elytra light red with pale spots, or black with red spots, normally seven on each, but sometimes reduced to two. Punctuation unequal. Thorax with front and hind margins pale, often also with a medial line and spot near the hind angles, .23 in... *14-guttata*, Linn.

Elytra entirely pale or with a longitudinal line, and a spot on each side (the spot often confluent with the line) dark or black. Prothorax pale, with black spots often coalescing into an **M**-shaped mark, with a dot on each side, or varying infinitely in size and shape. Form oblong-oval, less convex, .17 in. ..... *picta*, Rand.

MYSIA, Muls.

M. pullata, Say. Oval, convex, head black with two yellow frontal spots, thorax black with narrow whitish front margin, sides broadly white and enclosing a black spot. Elytra reddish, sometimes with an irregular blackish dorsal vitta. Legs usually black, .28 in. Larger than *Coccinella sanguinea*, which it recalls at first sight, and with the thorax differently marked.

ANATIS, Muls.

Two species are recorded from Canada, differing thus :—

Elytra very distinctly punctured; thorax yellowish white, with a heavy, more or less **M**-shaped discoidal black mark, and a black marginal spot near the hind angles. The elytra are usually yellowish with black spots, arranged in three transverse rows, though occasionally specimens are found in which the elytra are brown or nearly black. Legs wholly or in part yellow, .30–.38 in. (Fig. 49)..... *15-punctata*, Oliv.

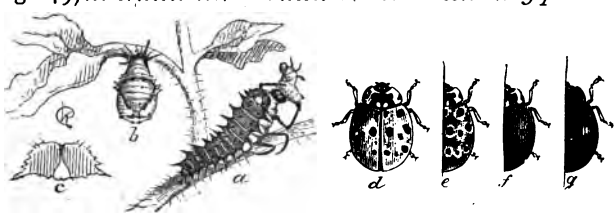

Fig. 49.

Elytra quite smooth, with oblong piceous spots, variable in form and extent, so that nearly the entire disk may become piceous, enclosing small yellow stripes or blotches..... *subvittata*, Muls.

The former is our largest Coccinellid, and is easily recognized. The latter I am unacquainted with, and owe the characters on which the separation is made to the kindness of Dr. Horn.

PSYLLOBORA, Chevr.

A small, yellowish-white species (*P. 20-maculata*, Say.), only .08 to .10 in. in length, with numerous black spots; cannot be mistaken for anything

else, since it is the only black-spotted Coccinellid of such small size and hemispherical shape in the Canadian fauna.

CHILOCORUS, Leach.

C. bivulneratus, Muls., is the only Canadian species. It is a rounded, very convex species, with a very short thorax and wide margins to the elytra, which are black, with a red discoidal spot. The abdomen is red. Length, .20 in. Fig. 50, imago; Fig. 51, larva.

Fig. 50.

Fig. 51.

BRACHYACANTHA, Dej.

One species comes from our region, *B. ursina*, Fabr., a rather small, oval convex insect (my specimens varying from .09 to .16 in. in length), black above, head yellow, the thorax with front margin yellow in the male. The elytra are black, with five yellow spots, one humeral, one basal, two medial and one sub-apical. The variety *10-pustulata*, Melsh, includes the small specimens in which the head is often black, with an orange spot on the vertex.

HYPERASPIS, Chevr.

Resembles *Brachyacantha* in form, but differs in having no spine on the anterior tibiæ. The ornamentation in the Canadian species is also usually less profuse.

A. Elytra black, with marginal spots or lateral stripe and a discoidal spot before the middle yellow. Sides of prothorax (in ♂ the front margin and head also) yellow, .08–.10 in..... .....*undulata*, Say.

AA. Elytra black, without series of lateral spots or stripes.

b. Prothorax black (♀), with sides and front margin pale (♂).

Elytra black, each with a rounded red spot at about the middle, and sometimes another small one near the tip, .09–.16 in..... .....*signata*, Oliv.

bb. Prothorax with lateral spot or margin pale in both sexes, ♂ with head pale.

Elytra each with a round spot at middle and two small ones (sometimes wanting) one-fifth from the tip, sides of prothorax yellow; ♂ with front margin and head also yellow, .08–.12 in..... .....*proba*, Say.

Elytra each with a round red spot near the tip, thorax with a large lateral spot, .11–.12 in.....*bigeminata*, Rand.

Fig. 52.

Fig. 52 represents *H. undulata*.

COCCIDULA, Kug.

A single species is known, *C. lepida*, Lec., about .12 in. in length, pubescent, and of rather elongate form. My specimens are yellowish above, the head black, except at sides. Elytra with a broad black common sutural stripe, dilated at apex and extending three-fourths to tip. At base this stripe is also dilated, and extends across to the sides, where it becomes confluent with a broad, black lateral vitta, which runs beyond the middle. Beneath, mostly black, the legs, sides of prothorax and four terminal abdominal segments yellow. Antennæ longer than usual, yellow.

The remaining Provinces of Canada, after excluding Ontario and Quebec, seem to have furnished comparatively few additional species of Coccinellidæ; the few published records, that I am able to find (excepting *Scymni*) are appended.

Ceratomegilla ulkei, Cr. Hudson's Bay. "Oval, subopaque, antennæ and tarsi ochreous; head with a white spot in front of each eye, thorax bordered with ochreous on the sides, anterior angles broadly ochreous, and a very minute line in the middle of the anterior margin also ochreous; elytra rather closely punctate, a triangular spot on the base, the external margin irregularly, and an elongate common sutural spot near the apex fulvous. L., .22 in." Unknown to me.

Adonia constellata, Laich. Nova Scotia. "Black, tibiæ, antennæ and entire front of head pale; thorax with a narrow border, abbreviated medial line connected with the anterior margin, and a round dot on either side, white. Elytra with a scutellar spot, and six others (as in *Hippodamia*) variously united or absent." L, 19 in.

Eriopsis connexa, Germ. Vancouver. "Oblong, black; thorax with the sides and a spot on the front and hind margins yellow. Elytra with the base, margin and two dorsal spots yellow; the marginal line is dilated in five places, one basal, one subhumeral, one medial, one at three-fourths and one sub-apical. L., .22 in."

Hippodamia moesta, Lec. Victoria, Van. Isl. (var. of *Lecontei*). Elytra entirely black, with a small basal dot near the scutellum and a triangular marginal subapical spot, yellow. L., .29 in.

H. falcigera, Cr. Slave Lake, Hudson's Bay. Black, head with a small yellow frontal spot; thorax without discal marks, with a narrow uniform yellow border. Elytra yellow, with the suture black (narrowing out before the apex), and each with a black, equally broad vitta, suddenly incurved before the apex. L., .22 in.

H. americana, Cr. Hudson's Bay. Tibiæ pale, metepimera black, thoracic margin narrow in front, broader and emarginate at sides, sutural vitta suddenly dilated at one-third. L., .20 in.

Coccinella transversalis, Muls. Victoria, Van. Isl. A variety of *C. transversoguttata*, in which the basal band is divided, or only the scutellar spot left. It, therefore, resembles, superficially, *C. monticola*, from which it may be separated by the thoracic spot, as shown in the preceding table.

Anatis Rathvoni, Lec. Nanaimo, Van. Isl. (Holland). May be known from *A. 15-punctata* by the black meso-and metepimera.

Psyllobora tædata, Lec. Victoria, Nanaimo, Van. Island. Smaller than *P. 20-maculata*, spots mostly brown, sub-confluent, punctuation fainter.

The more essential bibliography of this family is not extensive, but in part very difficult to procure. The following are the principal titles :—

1850. Mulsant. Species des Coleopteres trimeres securipalpes. Ann. Soc. d'Agric., Lyon, Ser. II., 1850. Supplement Ann. Soc. Linn., Lyon, Ser. III., 1853. Additions et rectifications, l. c., Ser. II., 1856.

1852. Le Conte. Remarks upon the Coccinellidæ of the United States. Proc. Acad. Nat. Sci., Phila., Vol. VI.

1873. Crotch. Revision of the Coccinellidæ of the United States. Trans. Am. Ento. Soc., IV.

1880. Le Conte. Short studies of North American Coleoptera. Trans. Am. Ento. Soc., VIII. (p. 186, *Hyperaspis*).

PHILAMPELUS ACHEMON.

While collecting on the 29th of last June, at an electric light on the outskirts of Toronto, in company with Mr. H. R. Hayter, he captured a ♀ specimen of *Philampelus achemon*, Drury. The insect had lost one antenna, but was otherwise in perfect condition. I have not heard of any other capture of this insect near Toronto.

G. M. Stewart, Toronto.

ON THE LARVÆ OF TWO SPECIES OF ARACHNIS.

BY HARRISON G. DYAR, NEW YORK.

The larvæ of two species of Arachnis, from Mexico, were given to me by Mr. Jacob Doll. They are the following:—

Arachnis aulea, Geyer.

Egg.—Shape of two-thirds of a sphere, with flat base. Shining, pearly, iridescent. Diameter, .6 mm. The reticulations are rounded, moderately distinct, of quite uniform size, but smaller at apex. On the angles of the reticulations a series of short, stiff spines (½inch objective).

First stage.—Head bilobed, the lobes full, rounded; clypeus large, mouth projecting. Colour shining, blackish, ocelli black, mouth brown; width, .3 mm. Body, pale whitish-brown, shading into a milky colour dorsally. Warts small, black, hairs single from i. and ii. on joints 5-12, several from a wart on the others, pointed and very minutely spinulose. Cervical shield, thoracic feet and the abdominal ones outwardly, black.

Second stage.—Hairs more numerous, several from each wart, black, bristly. Width of head, .4 mm., colour shining black. Body pale chocolate-brown, with a diffuse darker sub-dorsal band, and very faint narrow, pale dorsal line. Warts black.

Third stage.—Head shining black; width, .6 mm. Body dark blackish-brown, with a flesh-coloured, narrow, dorsal line. Warts black; hairs of different lengths, stiff, more abundant at the extremities than centrally, with a few long, white ones anteriorly. Slight white lines above warts iii. and iv.

Fourth stage.—Dorsal space on joints 6-10 marked with brick-red around wart i.; dorsal line very narrow, pale; lateral white lines obscure. Hair on joints 2-5 and 11-12, more abundant and longer than centrally; black, the subventral hairs white. Width of head, .9 mm.

Fifth stage.—Head rather square, black; width, 1.2 mm. Body all black, with a narrow red dorsal line. Warts and thoracic feet shining. Hair black at ends, foxy-red centrally, the long anterior and posterior hair and most of the subventral ones pale, nearly white.

Sixth stage.—Head as before; width, 1.9 mm. Body black, immaculate, the warts shining; abdominal feet light reddish. Hair bristly, pointed, foxy-red, mixed with black, with a few long and pale; subventrai hair indistinctly paler than the rest. Spiracles small, white.

Seventh stage.—Head black, reddish at vertex; width, 2.5 mm. Body as before, but the central lateral warts are brownish. Subventral hair scarcely paler.

Eighth stage.—Black, the warts brown; hair largely black, but still partly foxy-red. Abdominal feet dull crimson; spiracles reddish. Width of head, 3.4 mm.

Ninth stage.—Hair all black, body sooty black, warts light-brown, spiracles white. Thoracic feet black, abdominal ones dull crimson. Head black, labrum and antennæ pale; width, 4.5 mm. When full fed the larva hybernated until the folllowing June. It then spun a large transparent double cocoon of soft silk, mixed with a few hairs, and the moth emerged in July.

Arachnis suffusa, Schaus.

Egg.—Nearly spherical, but with flattened base, somewhat conoidal; diameter, .6 mm. Colour fleshy yellowish with a pearly-bluish lustre. Magnified 50 diameters the surface is covered with large shallow pits with ill-defined edges, not sharp enough to form reticulations.

* * * * *

Second (?) *stage.*—Head very pale yellowish, shining; the cluster of large ocelli black, mouth brown, a blackish shade at vertex; width, .6 mm. Warts quite large, but concolorous and inconspicuous, the hair bearing tubercles only black. Colour pale greenish-yellow, with a faint white dorsal line. Cervical shield small, lens-shaped, brownish. Warts ii. and iii. on joints 3, 4 and 12 tinged with dark orange. Hair fine, not abundant, brownish.

Third stage.—As before; width of head, 1 mm. Traces of a black subdorsal line. Hair more abundant, mostly short, white, but mixed with a few very long hairs, some of which are black. Feet colourless.

Fourth stage.—Head bilobed, brownish-yellow, ocelli black, mouth brownish, jaws black; width, 1.45 mm. Body rather sordid green, the thoracic segments, and an area around wart iii. on joint 12, shaded with orange; feet and venter whitish. A narrow, defined, white dorsal, lateral and substigmatal line, the lateral shaded above and below with black dottings, and enclosing the warts of row iii. Warts large, concolorous, the hair granules black. Hair long, stiff and straight, but fine, spinulose, white and black intermixed. Some hairs 8 mm. long. Length of larva, 15 mm. Line of tracheæ evident.

Fifth stage.—Head concealed beneath the hair of joint 2, pale brownish; width, 2.2 mm. Dorsal space whitish-gray, dorsal line white, narrow; lateral space dark greenish-gray, pale at the extremities; subventral space greenish with sordid white subventral line. Warts large, pale, the hair granules black, row iv. slightly orange, distinctly so anteriorly and posteriorly, especially on joint 12. Hair long, bristly but fine, abundant, black and white.

Sixth stage.—Head partly retracted below joint 2, its suture well-marked; orange-ochraceous, labrum and bases of antennæ yellow; width, 3 mm. Body gray, punctured and wrinkled with intermixed mottlings of fine white streaks and minute black dots. A poorly defined white dorsal line containing minute black dots; subdorsal line obsolete, but its location marks a boundary, where the colour becomes darker gray laterally. Warts i.-iii., pearly gray, like the body, wart iv., orange. A bright yellow, broad substigmatal line; wart v., slightly orange; vi., whitish with yellow bases. Thoracic feet coloured like the head, abdominal ones slightly orange-tinted. Hair dense, of quite even length, pointed, bristly, heavily spinulated, black and white about evenly mixed, though there is considerable variation in this respect in different larvæ, some having the hair nearly all black. From the thoracic segments and joints 12-13, a few white hairs of great length (15-17 mm.). General appearance neat, silvery-gray. When full fed, the larvæ spun slight cocoons and hybernated in them. Changed to pupæ the following spring, and the moths emerged in June.

SHALL WE USE THE NAME EUDRYAS?

BY A. R. GROTE, A. M., BREMEN, GERMANY.

So far as I have present references Berg is the first to use again the term *Euthisanotia* for *Eudryas unio* and allies in his paper on Argentine moths. Berg's species is, however, as I have shown, not congeneric with *unio*, but belongs to my genus *Copidryas*. More recently Neumoegen & Dyar use *Euthisanotia* and cite Boisduval's *Eudryas* as a synonym. The facts appear to be these. Hübner, in his Zutraege, 3rd Hundred (N. & D. call it "Vol. III."), p. 12, No. 216, fig. 431–2, describes and illustrates *Euthisanotia unio* for the first time. He calls it a Noctua. In the

same Hundred (1825), a few pages further on, 39, No. 295, he describes Cramer's *timais* and refers it as congeneric with *unio*. His genus *Euthisanotia* thus comprises *unio* and *timais*. *Timais* was almost certainly autoptically unknown to Hübner when he wrote the Verzeichniss; he figures it in the Zutraege on account of Cramer's defective figure (unrichtiges Bild). In the Verzeichniss Hubner refers *timais* to *Xanthopastis*, and this course leads Berg to suggest that this latter term should be used for *timais*. Evidently in the Zutraege Hubner corrects this reference, and, in effect, *Xanthopastis* is really a synonym of *Polia*, Hubn. The European species of *Polia* show yellow dottings *(flavicincta)*, and hence Hubner's generic name. Cramer's figure of *timais* shows the yellow dottings of this species. Hubner lays his greatest stress on markings and colour, and so, in the Verzeichniss, Cramer's species is catalogued with the European "*Poliæ*." Boisduval, in 1836, found thus two species of *Euthisanotia*, 1825. He took *unio* of the two generically dissonant species as the type of his new genus *Eudryas*. Was he free to do so? Does the fact that Hubner figures first (p. 12) *unio*, and then (p. 39) *timais*, make *unio* the type of *Euthisanotia*? Or, is *Euthisanotia*, 1825, a mixed genus?

The rule, as I understand it, with regard to mixed genera, is that the succeeding authority may take any of the species as the type of the new genus, unless the original type is actually designated. This is not the case with Hubner's genera, except by inference in the Tentamen, where only one species is given, which is, of course, the type. This makes the Tentamen so valuable. It is now generally known that Ochsenheimer and Treitschke's genera are only catalogue names, and catalogue names for such mixed assemblages that the "type" is difficult to decide. But the Tentamen often gives us the key, by showing us the species for which such names as *Agrotis*, *Apatela*, *Polia*, etc., were originally intended. It is an error to assume that the first species in any of the Verzeichniss genera is the type. In seeking for the type, the student must study all subsequent authorities to find out all restrictions of the original term. Such restrictions of the original generic title for a mixed genus have the force of priority and must be respected. A short and easy way is to refer to the original and take the first species as the type of a mixed genus, but this is a rough and insecure method. In my Buffalo List I have given some results of my studies as to a few of the older Noctuid genera, and these results, where my facts cannot be disputed, must be respected.

The question as to *Eudryas* is rendered difficult by Hubner's separation of the species by several pages, but virtually it seems to me we have to do with a mixed genus. For the use of *Eudryas* for the type *unio*, we have, then, Boisduval, Harris, Packard, Walker and myself. For the use of *Euthisanotia* for *timais*, we have the British Museum Catalogue and my own writings.

Upon a related point, I would say that it is now held generally by European classificators that a change in a new specific or generic title itself or its limitation by an author in the same work or book, or, if a serial, in the same series of papers, or year or volume, must be respected. This would cover Guenée's changes of specific names in the Species Genéral. We must therefore write *Orthodes enervis*, *Catocala viduata*, etc. To this extent at least authors may correct their original publication. There will be no valid objection then to the latter name *Orthosia euroa*, G. & R. This reading would inferentially show that Hubner's reference of *timais* to *Euthisanotia* is sufficiently valid for its use as the type of the genus under Boisduval's restrictive action in 1836. We may therefore continue, I think, to use *Eudryas* for *unio* and congeneric species.

The question, I have admitted, is a difficult one, and the view I here take of it may be thought not entirely uninfluenced by my respect for the nomenclature of Harris's Insects Injurious to Vegetation. It is true I am unwilling to lose *Eudryas* from our lists; but, if the case was quite clear, I should not be free to object. I desire also to show that questions as to generic types are not always easy to solve; they demand some thought, some study beyond the mere reference to a page in some book. In the present case Hubner's prior reference of *timais* to *Xanthopastis*, Verzeichniss, 1818, adds to the difficulty. I think it not uninteresting to have followed Hubner's action with regard to *timais*. Evidently the yellow dots in Cramer's figure led him to believe he had to do with a foreign species of *Polia*. Afterwards, when he recognized Cramer's species in nature, he was evidently disappointed, and wished to correct the generic position of the moth. And, in his new reference, he is equally out of the way; perhaps, indeed, his second mistake is greater than the first. Here again it is the gay colours of *timais* that make him associate it with *unio*. Both are odd-looking moths, having a differing, while equally strange beauty. The notion that in *unio* and allies we have to do with aberrant

noctuids is not confined to Hubner. The form, the discal spots on primaries, the simple antennæ make the view plausible, so that, not so long ago, Moeschler is of this opinion. I may remark that I have never seen so pale a specimen of *timais* as that figured by Hubner. The pretty pink of the Spanish moth (which comes up to us in the Middle States from the South, blown against our light houses along the coast) has all faded out on Hubner's plate. Are there two species as suspected by Gueneé from alcoholic larvæ? My first specimen of *timais* was given to me by my old friend, Mr. W. H. Edwards, and I fell a victim to its attractions to the extent of redescribing it. If I had then conceived my theory of the migration of moths during the summer, following the gulf stream and the prevalent direction of the wind, from south to north, I should not have made my mistake. While Dr. Thaxter shows that *timais* breeds in Florida, it is still a tropical Gortynid form and contrasts with the rest of our North American Noctuidæ, which generally favour the European type.

NOTES ON SOME SOUTH-WESTERN HEMIPTERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

In the CANADIAN ENTOMOLOGIST, 1892, pp. 193–197, the writer published some notes on New Mexico Heteroptera and Homoptera. The notes on the fifty-three species in the present paper are additional and complete the list, so far as the names can be obtained, of all the Hemiptera collected by the writer in New Mexico and Arizona.

In seven cases there are no localities attached to the species. This is because the numbers of those species were returned to me in such confusion by Dr. Skinner that they can not be connected with the data referring to them.

It should be mentioned that the Homoptera and Heteroptera are not separated in the list, but are arranged together in alphabetical order.

Acanonia bivittata, Say.—Grand Canon, Arizona. Hance trail. July 8 and 11, 1892. Two. Det. Uhler.

Agalliastes sp.?—Soledad Canon, Oregon Mts., N. Mex. May 23, 1891. One. A small black capsid, with extremity of wing covers glassy. Eyes red. Det. Uhler.

Anasa tristis.—Las Cruces, N. Mex. July and August. Very numerous on college farm, causing death of squash plants. Also received from Eddy, N. Mex.

Anasa Uhleri, Stal.—Las Cruces, N. Mex. Often mistaken for the squash bug, *A. tristis*. Det. Uhler.

Apiomerus spissipes, Say.—Las Cruces, N. Mex. Several. Det. Uhler and Riley.

Brochymena annulata, Fab.—Las Cruces, N. Mex. Several specimens. Det. Riley.

Brochymena obscura, H. Schf.—Las Cruces, N. Mex. May 12. On *Prosopis juliflora*, on mesa. One. Det. Uhler.

Bythoscopus pallidus, Fitch.—Det. Uhler.

Campylenchia curvata, Fab.—Det. Uhler.

Capsid (new to Nat. Mus. Coll.)—Continental Divide, Tenaja, N. Mex. August 2, 1892. Two. Det. Riley.

Chelinidea vittigera, Uhler.—Grand Canon, Arizona. Hance trail. July 10. One. Det. by comparison.

Cicadula, sp.—Eddy, N. Mex. Sept. 1, 1891. Received specimens of this leaf-hopper from Mr. F. E. Downs, with report that they were doing much injury to potato vines. It is a small species, much resembling the vine *Typhlocyba*, and is about 3½ mm. long. Det. Riley.

Clastoptera delicata, Uhler.—Det. Uhler.

Compsocerocoris annulicornis, Proct.—Det. Uhler.

Conorhinus, sp.—Los Palomos, N. Mex. June 14, 1892. One. A dark-brown reduviid. Det. Riley.

Corimelaena extensa, Uhl.—Cedar Ranch, Arizona. July 6, 1892. On *Nicotiana*, sp. (See Psyche, 1893, pp. 547–548.)

Coriscus ferus, L.—Las Cruces, N. Mex. May 9 to 28, 1891. Many swept from alfalfa. A small grayish reduviid-like species. Det. Uhler.

Corizus hyalinus, Fab.—G Bar Ranch, Zuni river, Arizona. July 27, 1892. One. A *Nysius*-like heteropter. Det. Riley.

Cydnus (?) *obliquus*, Uhler.—Grant County, N. Mex., (W. J. Howard, 1882). Two. Det. Riley.

Darnis, sp.?—Las Cruces, N. Mex. Det. Uhler.

Diplodus luridus, Stal. Det. Uhler.

Euschistus fissilis, Uhler var.—Las Cruces, N. Mex. May 8 to 12, 1891. On alfalfa. Det. Uhler.

Euschistus servus, Say.—Grand Canon, Arizona. Hance trail, part way up towards the rim. July 8 and 12. Two. Det. Uhler. Las Cruces, N. Mex. July 8, 1891. One on cabbage on college farm. Reported to occur occasionally on cabbages. Det. Riley.

Gargaphia opacula, Uhler.—Las Cruces, N. Mex. July 16, 1891. A single adult, with a large number of young, of this small grayish species was taken on under side of leaves of very young egg plants. The plants were badly infested with the young, and showed abundant evidence of their work. Det. Uhler. This species was described by Mr. Uhler in his report on the Heteroptera of the Death Valley Expedition, from one specimen from the Argus Mts., California. Mr. Uhler examined the Las Cruces (adult) specimen in 1892, before receiving the Death Valley material, but did not venture to describe it at that time from the single specimen.

Geocoris punctipes, Say.—Las Cruces, N. Mex. May 9 to 28, 1891. On alfalfa. Some are almost black, but are determined by Mr. Uhler as same. A pair *in coitu* of lighter ones, May 28. Det. Uhler.

Hadronema, sp.—Cocanini Plateau, Arizona. Twelve miles north of Cedar Ranch, on road to Grand Canon. July 6, 1892. Two beaten from *Atriplex canescens*, with *H. militaris*. This is a larger species than the latter. Det. Riley.

Hadronema militaris, Uhl.—Cocanini Plateau, Arizona. Twelve miles north of Cedar Ranch, on road to Grand Canon. July 6, 1892. Several specimens beaten from *Atriplex canescens*. Det. Riley.

Harmostes propinquus, Stal.—Las Cruces, N. Mex. Det. Uhler.

Harmostes reflexulus, Say var.—Las Cruces, N. Mex. May 28, 1891. One swept from alfalfa. A green reduviid-like species. Det. Uhler.

Lameria collaris, Uhler.—Grand Canon, Arizona. Hance trail. July 8. One. A very small bluish species, with pale yellowish face and sternum. Eyes black, wings bluish. Det. Uhler.

Largus cinctus, H. Schf. var.—Las Cruces, N. Mex. Common. Det. Uhler.

Lioderma congrua, Uhl.—Las Cruces, N. Mex. May 8, 1891. Two adults of this fine green species on alfalfa. July 16, 1891. One taken on cabbage on college farm. Det. Uhler. On Nov. 13, 1892, there was taken on *Salix longifolia* in Alameda, a specimen very similar to this species, but distinct. It may be *Thyanta custator*, F., but is much lighter green.

Lyctocoris campestris, Fab.—Las Cruces, N. Mex. (?). Number lost, which makes the locality doubtful. Det. Riley.

Lygaeus bistriangularis, Say.—Chaves, N. Mex. August 6, 1892. One. Det. Riley.

Lygaeus Kalmii, Stal.—Las Cruces, N. Mex. Det. Uhler.

Lygaeus reclivatus, Say.—Las Cruces, N. Mex. July 8, 1891. On squash on college farm. Previously taken on various plants, mostly on flowers of *Aster spinosus*. Belen, N. Mex. August 7, 1892. One. Grant Co., N. Mex. (W. J. H.), One. Det. Riley.

Melanocoryphus facetus, Say.—Las Cruces, N. Mex. May 8, 1891. One on alfalfa. May 23, one on ground in Soledad Canon. May 24, one on ground on plain to east of Organ Mts. Det. Uhler and Riley.

Membracid.—Cocanini Plateau, twelve miles north of Cedar Ranch, Arizona. July 6. A long-horned tree-hopper found in numbers on the stems of *Ridellia tagetina*. They doubtless suck its juices.

Metapodius granulosus, Dallas.—Soledad Canon, Organ Mts., N. Mex. May 23 and 24, 1891. Three inside head, at bases of leaves of a century plant (*Agave*), up a north side branch of the Canon. The *Agave* was probably *A. Parryi*. Det. Uhler.

Murgantia histrionica.—Las Cruces, N. Mex. Numerous in July on Chinese cabbages on college farm. Eggs and newly hatched young observed July 16.

Narnia femorata, Stal.—Grand Canon, Arizona. Hance trail. July 10. Three. Det. Uhler.

Narnia pallidicornis, Stal.—Las Cruces, N. Mex. One. A grayish-brown bug resembling *Leptoglossus*. Det. Riley.

Nezara marginata, Beauv.—Grand Canon, Arizona. Hance trail. July 11 to 12, 1892. A bright green pentatomid. Found in numbers on the thin green pods of *Cercis occidentalis*, a round-leafed leguminous tree. From 2,000 to 3,000 feet below the rim. They were found only on this tree, and doubtless pierce the pods. Adults and nymphs. Det. Uhler.

Notonecta mexicana, Amyot.—Grand Canon, Arizona. Hance trail. July 8 to 11. Common in the stream. Larvæ and nymphs also taken. Det. Uhler.

Oecleus decens, Stal.—Las Cruces, N. Mex. Aug. 19. One on stalk of *Helianthus annuus*. Aug. 21, one on *Xanthium* leaf. Det. Uhler.

Ormenis pruinosa, Say.—Grand Canon, Arizona. Hance trail. July 8. One. A grayish-brown homopter. Det. Uhler.

Phymata Wolffii, Stal.—Las Cruces, N. Mex. Common. Also Grand Canon, Arizona. Hance trail, near rim, July 11 and 12. Det. Uhler.

Resthenia sp. ?—Soledad Canon, Organ Mts., N. Mex. May 23, 1891. Four specimens on thistle, mostly on the flowers. A beautiful black and deep red capsid. The antennæ were missing, which made the determination uncertain. Det. Uhler.

Salda interstitialis, Say.—Det. Uhler.

Scolops sp. ?—Las Cruces, N. Mex. A long-horned tree hopper. On herbage. Det. Uhler.

Spilalonius geniculatus, Stal.—Grant County, N. Mex. (W. J. H.). One. A pale-coloured diplodid. Det. Riley.

Stiretrus anchorago, Fab. (Nymph).—Las Cruces, N. Mex. August 19, 1891. Several nymphs of this pentatomid taken on *Helianthus annuus*. The nymph is jet black, with a large red spot. The larvæ are almost wholly black. No adults. Det. Riley.

Thyanta custator, Fab. and var.—Las Cruces, N. Mex. Nov. 13. One. A light green pentatomid, with five very faint orange flecks on each edge of abdomen. Det. Riley.—Var. Las Cruces, N. Mex. May 8, 1891. One on alfalfa. Wholly of a clear light green. Det. Uhler.

CORRIGENDA.

Page 251, line 21 from top, for "Limer," read, Zimm.

Page 254, line 25 from top, "One of the types of this species," should precede, "*B. fumatus*," etc., as it refers to *B. punctatissimus*.

Page 256, line 16 from top, for "(rods)," read, pods.

Page " line 3 from bottom, for "back," read, bark.

NOTES ON NOVA SCOTIAN DRAGONFLIES.

BY PHILIP P. CALVERT, PHILADELPHIA, PA., AND WILLIAM SHERATON, TORONTO.

(In 1889 and 1890, Mr. William Sheraton, of Wycliffe College, Toronto, collected some Odonata at Pictou, Nova Scotia, for me. At the end of the collecting season of 1889, he sent me a letter containing his field notes on the specimens captured. These observations are so interesting, in my opinion, that any publication in which they appear ought also to bear Mr. Sheraton's name as joint author. He has kindly acceded to my wish in this respect, although modestly protesting that his part has "been only such as any child could have done." All notes in the present paper concerning localities, habits and dates are to be credited to Mr. Sheraton, while I am responsible for the determinations and the few bibliographical notes. With the exception of *Aeschna constricta*, none of the species mentioned below had been recorded from Nova Scotia previous to Mr. Sheraton's taking them, although I have since cited the locality, for some of the species, in various papers—P. P. C.)

The dragonflies which I obtained in Pictou were, with few exceptions, from three localities, (1) a small, shallow, weedy pond in an open field—"Simpson's pond"; (2) a small, boggy brook, full of rushes, etc., in a back pasture (marked on envelopes, "Brook north of Priest's Barn," or "Mr. Simpson's back pasture"); (3) a much larger and deeper pond, surrounded on every side but one with a thick second growth of spruce (marked "Pond on Back Road near the 'Boar's Back"). Most of the kinds I got were found in all three localities, but they all appeared to have some preference in the matter.

Lestes unguiculata, Hagen. Pasture, Aug. 21, 1889.

Lestes uncata, Kirby (*hamata*, Selys, 1862.) June 19, 1889, common about Simpson's Pond and the boggy brook, and I think were also found at the larger pond, although I have not recorded the capture of any specimens there. July 23, 1889, the pasture; also 1890.

Enallagma ebrium, Hagen. Exceedingly abnndant from the beginning (June 19, 1889) to the end of the season in the first locality, and quite abundant also about the boggy brook, particularly in the earlier part of the summer, and at points where it broadened into small pools with more or less open water. They were also abundant at the larger pond by the Boar's Back (a great ridge of gravel, running for some miles

through the country, and apparently the shore of a now vanished lake) on the one occasion on which I was able to visit it, July 23.

Cordulegaster diastatops, Selys. One male, June 24, 1889, brook.

Aeschna constricta, Say. Two males, July 26, 1889; one female, Sept. 2, 1889, may belong here or to the next species. First noticed towards the end of June, and during the remainder of my stay in Pictou was frequently seen everywhere, often far from water, but was difficult to catch. Two of the specimens I sent you were captured in rather unusual ways. One I knocked down with a stick, as I was walking along the road one evening, and I picked him up before he succeeded in picking himself up. The other alighted upon me one morning when I was standing on a ladder untying a clothes line, in such a way that when I lowered my arm (quite unconscious of its presence) it was held securely between my arm and my side. This latter occurrence seemed to me rather indicative of stupidity in the insect, other specimens of which I have known to fly almost in my face when I was not endeavoring to catch them. On the other hand they "dodged" the net with great skill, and on one occasion having found two hovering over a brook, at which I had seen them, when without a net, some hours before, having captured one, I made an unsuccessful sweep at the second, which had flown away a short distance on my scooping in the first, and then returned, when it flew straight away from the brook and did not return, at least to that part, although I waited for some time.

Aeschna clepsydra, Say. Three males, July 26, 1889. All my three specimens were taken at the deep pond near the Boar's Back, but I think I have also seen them in other localities, and flying about the country like the preceding species, from which it is, when on the wing, to me, indistinguishable at a short distance. (Two of these males are cited in a paper on this species in *Ent. News*, Vol. V., p. 11.)

Somatochlora Walshii, Scudder. One female, July 23, 1889. I found one female laying her eggs in a little bit of open water, so surrounded and overarched by rushes that her movements were much restricted. (This female, which still remains the only known individual of its sex, has been described by the first of the two authors of the present paper in Trans. Am. Ent. Soc., xvii., p. 33, 1890, with a supplementary note in *Ent. News*, iii., p. 23, 1892.)

Libellula quadrimaculata, Linné. One female, July 24, pasture; two males, one female, July 26, 1889, Abundant in all three localities, but

about the shallow pond I never succeeded in catching a single specimen. They "dodged" every time. I captured one which had alighted on a stump near the boggy brook, but as I was taking it out of the net it grabbed my finger savagely, whereat I was so taken aback that I let him slip from my fingers, when he, of course, lost no time in "making himself scarce." After this I made many vain attempts to capture specimens of this kind, but got none. On visiting the pond near the Boar's Back, however, I succeeded in capturing three, stealing up and sweeping them in suddenly when they were close under the steep bank at one side of the pond. Five males, one female, 1890—pond half a mile east of Boar's Back, July 12.

Leucorhinia proxima, Calvert. Two males, July 26, 1889. I saw none, to my knowledge, away from the pond by the Boar's Back, where the two specimens I sent you where taken. (These were two of the types of the original description of this species in Trans. Am. Ent. Soc., xvii., p. 38, 1890.) One male, 1890.

Leucorhinia hudsonica, Selys. One male, one female, June 25, 1889; I never saw any but the two specimens I sent you, which were taken in locality No. 2. (These two were the types of what was too hastily baptized *Leucorhinia Hageni*, n., sp., with the first of us as sponsor, in Trans. Am. Ent. Soc., xvii., p. 36, Jan., 1890, and as promptly buried in *Ent. News*, i., p. 73, May, 1890. If there were any hopes of a revivification, it is only necessary to add that in July, 1890, on the occasion of a visit to Cambridge, Dr. Hagen and myself compared this couple with types of *L. hudsonica* in the Museum of Comparative Zoology, and satisfied ourselves that they were specifically identical.)

Leucorhinia intacta, Hagen. Six males, July 12, 1890—pond half a mile east of Boar's Back.

Diplax rubicundula, Say. June 25, July 24, Aug. 21, 1889.

Diplax obtrusa, Hagen. July 24, 1889.

(Mr. Sheraton's notes refer to these two very similar species together.) No. 7 (specimens of *D. rubicundula* taken June 25) was abundant in all three of the places in which most of my collecting was done, but especially so about the boggy brook, where I first saw it. They were easily caught. They had a curious habit of rising suddenly from the weeds about the brook, flying along a short distance not far off the ground, and then alighting upon it like a locust. The likeness to the latter insect in so doing was much increased by their size, colour, and by their flight, which

was slow and unsteady for a dragonfly. (The colours of the specimens taken June 25 are pale, indicating recent transformation, a condition which explains the peculiarities of the flight).

Kind No. 10 (older individuals of *D. rubicundula* and *D. obtrusa*) did not appear until late in July, but speedily became very abundant, and during the last part of the summer was by all odds the most common species, even outnumbering the little *Enallagma ebrium* at Simpson's Pond. The back of the abdomen of this species in life was of a brilliant red.

It may be well to add, by way of postcript, that the species of Odonata, other than those named above, which have been recorded from Nova Scotia are, with the original place of record :—

Lestes disjuncta, Selys, Bull. Acad. Roy. Belg. (2), XIII., p. 303, 1862.

Gomphus parvulus, Selys, Bull. Acad. Roy. Belg., XXI., pt. 2, p. 56, 1854 ; in his Monog. Gomph., p. 158, 1858, the locality is given as based on "un male dans la collection du British Museum."

Cordulegaster maculatus, Selys, Bull. Ac. Roy. Belg. (2), XLVI., p. 690, 1878 (Cape Breton).

Somatochlora elongata, Scudder. *saturata*, Hagen (no descr.), Syn. Neur. N. A., p. 138, 1861, "Selys' collection," Selys, Bull. Ac. Belg. (2), XXXI., p. 293, 1871, cites the Nova Scotian specimen as in the British Museum.

Somatochlora forcipata, Scudd. *chalybea*, Hagen (no descript.), Syn. Neur. N. A., p. 138, 1861, "Selys' collection".

Somatochlora tenebrosa, Say. *tenebrica*, Hag. (no descr.) Syn. Neur. N. A., p. 138, 1861, "Selys' collection".

Tetragoneuria semiaquea, Burm. Hagen, Proc. Bost. Soc. N. H., XVIII., p. 61, 1875, "Selys."

Cordulia Shurtleffi, Scud. *bifurcata*, Hagen (no descr.), Syn. Neur. N. A., p. 137, 1861, "Selys' collection".

Leucorhinia glacialis, Hagen, Trans. Am. Ent. Soc., XVII., p. 234, 1890, (Cape Breton).

The precise localities are not given in these records quoted.

There is much reason to think that the Odonate fauna of Nova Scotia embraces many more species than the twenty-two known at the present time to inhabit the Province.

A STUDY OF THE GENUS MENISCUS.

BY G. C. DAVIS, AGRICULTURAL COLLEGE, MICH.

*Synopsis of species.**

Abdomen entirely black or with white margins of segments.
Femora rufous or honey yellow.
Antennæ with yellowish annulus..... *Bethunei*, CR.
Antennæ without yellowish annulus.
Areolet present.
Abdominal segments without white margins.
Pleuræ more or less rufous, yellow spots before and beneath tegulæ ..... *scutellaris*, CR.
Pleuræ black, a yellow spot before and beneath tegulæ ..... *superbus*, PROV.
Pleuræ black, without spot before or beneath tegulæ ..... *parva*, CR.
Abdominal segments margined with white... *pulcherrimus*, CR.
Areolet wanting.
Mesothorax more or less rufous..... *ostentator*, n. sp.
Mesothorax black and yellow..... *mirabilis*, CR.
Femora black, areolet present.. .... *Slossonæ*, n. sp.
Abdomen rufous, black at base.
Areolet present, antennæ without annulus.
Posterior femora black with yellow markings..... *elegans*, CR.
Posterior femora rufous..... *comptus*, n. sp.
Areolet wanting, antennæ with white annulus.. *Michiganensis*, n. sp.
Abdomen black, banded with yellow at base of segments.....
.... *Johnsonii*, n. sp.

MENISCUS OSTENTATOR, n. sp.

♀. Length, 7 5 mm.; ovipositor, 7 mm. Black, polished; with orbital lines from occiput to middle of eyes in front, cheeks, clypeus, mandibles except tip, palpi, gula, cuneiform lines on mesonotum, tegulæ, spot in front, lines beneath extending irregularly back to posterior coxæ, sides of scutellum, line on lower pleuræ between anterior and middle coxæ, prosternum, anterior coxæ, middle and posterior coxæ except a black dash above and large spot inside, all the trochanters except black

**Meniscus Ashmeadii*, PROV., and *M. marginatus*, PROV., belong to *Pimpla annulipes*.

base, posterior tibiæ except black annulus near base and black extremity, and tips of the abdominal segments beyond the first, yellowish-white. Remainder of legs fulvous, with a black spot at the base of all the femora and an annulus near the tip of the posterior femora; tarsi dusky. Antennæ long, slender, black. Wings hyaline, without areolet. Mesosternum and meso-and metapleuræ rufous. Metanotum smooth, oval, coarsely punctured, with one small circular transverse carina near the abdomen. First segment of the abdomen shining, 2 and 3 finely punctured. ♂ with the abdomen as in the ♀. The head is yellow except the central part of the vertex and occiput, which are black. Pronotum and a spot on the front edge of mesonotum, black; remainder of mesonotum rufous, with yellow markings as in the ♀; scutellum, pleuræ and venter, yellowish-white. Antennæ reddish-brown, with scape beneath yellow. Legs same as in ♀ except more yellow.

Described from 3 ♀ ♀ and 1 ♂ taken at the Michigan Agricultural College.

MENISCUS SLOSSONÆ, n. sp.

♀. Length, 12 mm.; ovipositor, 8 mm. Black, with lemon-yellow markings as follows: orbits, two more or less united longitudinal stripes on the front, cheeks at base of mandibles, mouth except tip of mandibles, tegulæ, minute spot beneath and dash in front, sometimes wanting, V on scutellum, post-scutellum, central spot on metanotum, tips of abdominal segments 1, 2 and 3, and sometimes base of the first. Legs yellow, with all the coxæ, and posterior legs with first joint of the trochanter, femora except tip and base, tibiæ except base, and tarsi, black. Antennæ black. Apex of wings infumated; areolet large, petiolate. Thorax and head coarsely and closely punctured, metanotum rough. Abdomen shining, smooth.

Described from 3 ♀ specimens collected at the top of Mount Washington, N. H., by Mrs. Annie Trumbull Slosson, to whom I take pleasure in dedicating this species.

MENISCUS COMPTUS, n. sp.

♀. Length, 8 mm.; ovipositor, 6 mm. Black, with abdomen beyond second segment rufous. Orbital lines nearly enclosing base of antennæ, face, except three short black dashes just beneath antennæ, mouth, gula, nearly all of prothorax, tegulæ, line beneath, long line in front confluent with triangular spot on mesonotum, spot in front of scutellum, scutellum

except a small wedge in front, post-scutellum, a large irregular diagonal spot on mesopleura, spot beneath posterior wing, circular spot just back and above, semicircle around insertion of abdomen with a ray extending forward from each coxa, and a third from the abdomen, base and apex of the first two abdominal segments, 4 anterior coxæ and trochanters, stripe on posterior coxæ above and second joint of posterior trochanter, yellowish-white. Posterior coxæ and first joint of trochanter black; posterior tarsi dusky at tips; remainder of legs honey-yellow. Antennæ black, fulvous toward the tip. Wings hyaline, infumated at the apex; areolet small, petiolate. Entire thorax coarsely, but not closely, punctured. Abdomen smooth, shining.

Described from 2 ♀♀ collected at the Michigan Agricultural College.

MENISCUS MICHIGANENSIS, n. sp.

♀. Length, 10 mm.; ovipositor, 8 mm. Black, with yellow markings; abdomen beyond second segment rufous. Broad orbital lines, entire front, scape beneath, annulus on antennæ, mouth except tips of mandibles, gula, entire prothorax, tegulæ, line beneath, large triangular spot in front confluent with a cuneiform line on mesonotum, extending back nearly to the scutellum, venter except anterior part of mesosternum, with a continuation of the same on to the pleuræ, ending in a large hook beneath the wings, metapleuræ and two lines above joining posteriorly, base, apex and a large spot in the centre of the first abdominal segment, base and apex of second segment, connected by a longitudinal line, lemon-yellow. Posterior femora rufous; 4 posterior trochanters black at base, and coxæ with black stripe above; 2 hind coxæ black inside; extremity of posterior tibiæ, and basal joint of tarsi, except tip, black; remainder of legs lemon-yellow. Wings hyaline without areolet. Antennæ brown, black above. Thorax and face coarsely, but not closely, punctured. Abdomen smooth, shining.

Described from 1 ♀ taken at the Michigan Agricultural College.

? MENISCUS JOHNSONII, n. sp.

♀. Length, 11 mm.; ovipositor, 1.5 mm. Black, with yellowish-white markings, as follows: Entire head, except occiput, spot enclosing ocelli and antennæ, narrow central line beneath, reaching to clypeus, and tips of mandibles; prosternum; mesothorax with two cuneiform lines on margins of mesonotum, two stripes in front of scutellum, scutellum except posterior part and spot in front, two spots beneath primary wings and

another in front of middle coxæ, posterior part of mesosternum; metathorax with a transverse row of 5 spots across the anterior part and 3 across the posterior part; abdomen with first segment to spiracles and a short line in centre beyond, broad band at base of second and third segments, narrower band at base of succeeding segments and entire venter. Antennæ wanting. Legs honey-yellow, except 4 anterior coxæ beneath, which are whitish, joints 3, 4 and 5 of middle tarsi, which are dusky, and apical third of posterior tibiæ and basal fourth of first tarsal joint, which are black. Wings hyaline, somewhat infumated around the apical margin; areolet wanting. Entire thorax punctured, metanotum rugose. Abdomen somewhat clavate, smooth and polished.

Owing to the short ovipositor and shape of abdomen, this species will probably belong to a new genus, and is only temporarily placed here.

Described from 1 specimen taken at Jamesburg, New Jersey, by Mr. Chas. W. Johnson, to whom I take pleasure in dedicating this species, as a slight token of thanks for the many valuable specimens of Ichneumonidæ sent me.

NEW SPECIES OF TENTHREDINIDÆ, WITH TABLES OF THE SPECIES OF STRONGYLOGASTER AND MONECTENUS.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The following descriptions are offered, preparatory to publishing a list of the saw-flies of the Upper Cayuga Lake Fauna. The types are in the Entomological Collection of Cornell University.

Caliroa, Costa.

Caliroa Nortonia, n. sp. Body entirely black, head finely, densely punctate, clypeus emarginate, antennæ black, broad, of the same width throughout, third segment one-third longer than fourth, fourth and fifth subequal in length, sinus each side of the ocelli reaching the back of the head, from each side of the lateral sinuses there is another sinus starts off behind the posterior ocelli, crossing back of the median ocellus and running down each side of this ocellus for a short distance, where it becomes obsolete; tegulæ and collar very narrowly dull white, thorax and abdomen glossy black; legs white, coxæ, trochanters, basal half anterior and basal two-thirds of middle and posterior femora black,

posterior tibia with a band at apex, and posterior tarsus except base of metatarsus, brown; wings hyaline, veins and stigma black, costa at immediate base white, first submarginal cross-vein distinct. Length, 7 mm.

Habitat—McLean, N. Y. 1 ♂ 30th May, 1890.

This species is readily separated from *obsoleta* by the crossing sinus on the front, the colour of the femora, and the larger size. The species is dedicated to Mr. Edward Norton, the well-known student of American Tenthredinidæ.

STRONGYLOGASTER, Dahlb.

1. Lanceolate cell with a cross-line ..... 2.
   Lanceolate without a cross-line ..... 15.
2. Under wings with incomplete outer cells; if complete, no cross-vein in cell in front of lanceolate cell ..... 3.
   Under wings with complete outer cells, and with a cross-vein in cell in front of lanceolate cell ..... *pinguis*, Nort.
3. Antennæ in part pale ..... 4.
   Antennæ wholly black ..... 9.
4. Antennæ pale at apex ..... 5.
   Antennæ pale at base ..... *epicera*, Say.
5. Head testaceous ..... 6.
   Head black ..... 7.
6. Median lobe of mesothorax black, margined with white ..... *mellosus*, Say.
   Median lobe of mesothorax rufous ..... *terminalis*, Say.
7. Eyes margined before and behind with black ..... *apicalis*, Say.
   Eyes margined with white or rufous in part ..... 8.
8. Eyes margined before and behind with white ..... *pallidicornis*, Nort.
   Eyes margined behind with rufous, black in front ..... *rufoculus*, n. sp.
9. Lanceolate cell of posterior wings not attaining the margin, an appendiculate vein at apex ..... *abnormis*, Prov.
   Lanceolate cell attaining the margin, not with an appendiculate vein at apex ..... 10.
10. Eyes partly margined with white ..... *fidus*, Cress.
    Eyes wholly margined with black ..... 11.
11. All the coxæ and trochanters white ..... 12.
    Some of the coxæ and trochanters black or in part black ..... 13.
12. Scutellum black ..... *pallicoxus*, Prov.
    Scutellum white ..... *proximus*, Prov.

13. Abdomen entirely black.....*rubripes*, Cress.
Abdomen transversely banded above with rufous or yellow.... 14.
14. All the femora rufous.... .....*rufocinctus*, Nort.
The femora in part black.....*tibialis*, Cress.
15. Antennæ pale at base.....*rufescens*, Nort.
Antennæ entirely black..... 16.
16. Thorax reddish-yellow.....*unicus*, Nort.
Thorax black..... 17.
17. Abdomen wholly rufous.....*tacitus*, Say.
Abdomen in part black..... 18.
18. Abdominal segments two to four wholly pale..... 19.
Abdominal segments two to four in part black..... 24.
19. Coxæ wholly pale..... 20.
Coxæ entirely or in part black. ..... 21.
20. Scutellum black.....*pallicoxus*, Prov.
Scutellum white.....*proximus*, Prov.
21. Basal abdominal segment wholly black..... 22.
Basal abdominal segment not wholly black..... 23.
22. Femora black at base.....*annulosus*, Nort.
Femora rufous.....*luctuosus*, Prov.
23. Coxæ wholly black..... .....*impressatus*, Prov.
Coxæ waxen-yellow at apex.....*longulus*, Nort.
24. Abdominal segments yellow at base and black at apex
.....*multicinctus*, Nort.
Abdominal segments black at base and yellow at apex, or with only the two basal segments black..... 25.
25. Coxæ wholly rufous.....*soriculatus*, Prov.
Coxæ in part black..... 26.
26. Abdomen with the two basal segments black..... 27.
Abdomen with the two basal segments not wholly black..... 28.
27. Legs waxen-yellow.....*longulus*, Nort.
Femora in part black at base; female with a whorl of hairs at apex.....*pacificus*, MacG.
28. Abdominal segments finely margined with white.....*politus*, Prov.
Abdominal segments with the apical half testaceous or reddish-yellow..... 29.
29. Coxæ wholly black..... ..*annulosus*, Nort.
Coxæ pale at apex.....*distans*, Nort.

Strongylogaster rufoculus, n. sp. Head black, clypeus and labrum white, labrum broadly rounded, a prominent rufous spot behind each eye, antennæ black, segments six to nine white, the third segment one-third longer than the fifth, sinus at side of ocelli not reaching the back of the head; thorax black, the tegulæ rufous; apex of the abdominal segments slightly darker, basal plates black; legs rufous, coxæ black, posterior coxæ slightly marked with yellow, anterior and middle trochanters black, posterior yellow, femora and tibiæ rufous, posterior femora slightly marked with black at apex, tarsi yellow; wings slightly yellowish, veins brown, costa at base of stigma yellow, apex of stigma brown, lanceolate cell with an oblique cross-nervure, posterior wings with two middle cells, outer cells incomplete. Length, 11 mm.

Habitat—Ithaca, N. Y. 3 ♀ ♀, June 5–10, 1890.

Strongylogaster primativus, MacG., should more properly be referred to *Tenthredopsis*, having the cross-vein of the lanceolate cell perpendicular or wanting, and the third and fourth segments of the antennæ equal.

BIVENA,* gen. nov.

Wings with three marginal and four submarginal cells, the first marginal cell receiving the two anterior submarginal cross-veins and the second the third, the second and third submarginal cells each receiving a recurrent nervure, lanceolate cell open at the shoulder, subcontracted at middle with a cross-vein near the apex, subcosta wanting, posterior wings with two middle cells, the cross-vein closing the apex of the anterior one runs to the margin of the wing at about one-third the width of the cell, thence follows around the margin of the wing to the vein forming the posterior side of the cell; antennæ nine-jointed, filiform, reaching to about the base of the abdomen, the segments all of the same width, head as wide as the thorax, very slightly dilated behind the eyes; abdomen about as long as the head and thorax, somewhat widened at middle, ovipositor stout, of the usual type of Macrophya. Type, *Bivena maria*, sp. nov.

A very interesting genus, belonging to the subfamily Tenthredinæ. Easily separated from both the Lydiinæ and Xyliinæ by the absence of subcosta, from the former by the nine-jointed antennæ and from the latter in not having the ovipositor greatly exserted and the basal segments of the antennæ dilated.

*Bis, twice; vena, vein.

Bivena maria, sp. nov. Head black, with white on the anterior orbits, beneath the eyes, around the immediate base of the antennæ, a quadrangular spot between the antennæ, the clypeus, and the labrum; antennæ brownish-yellow, the third segment slightly longer than fourth, fourth and fifth subequal, clypeus truncate, sinus each side of the ocelli, reaching the posterior part of the head; the tegulæ, collar narrowly, the scutellum, cenchri, and apex of the basal plates, yellow; abdomen rufous, the basal half of the first segment and three apical segments, including the ovipositor sheath, black; legs yellow, the anterior and middle coxæ slightly at base, the posterior above and below, and the posterior tibia at apex, black; wings hyaline, veins brown, including the costa, stigma black, lighter at apex and behind. Length, 8 mm.

Habitat—West Danby, N. Y. 1 ♀, 31 May, 1890.

MONECTENUS, Dahlb.

1. Wings smoky; scutellum black; antennæ with thirteen segments ..... *fulvus*, Nort.

   Wings hyaline; antennæ with more than thirteen segments.... 2.

2. Lateral fulvous line of abdomen interrupted on the three or four basal segments; antennæ fifteen-jointed.... *suffusus*, Cress.

   Lateral fulvous line continuous from the base of the abdomen.. 3.

3. Antennæ fourteen-jointed..... *melliceps*, Cress.

   Antennæ sixteen-jointed..... *juniperinus*, n. sp.

Monectenus juniperinus, n. sp. Fulvous, with the following parts black: mandibles, antennæ, a lunate mark, including the ocelli, its horns reaching the antennæ; a broad dash on the lateral lobes, the scutellum, in some cases only its apex, metathorax, basal plates, tergum and venter except a lateral line, pectus, pleuræ except a dark fulvous spot, coxæ at base, and tarsi at apex; antennæ decidedly serrate beneath, with sixteen distinct segments; clypeus emarginate; wings hyaline, veins brown, caudal half of cross-vein between first and second submarginal cells hyaline, stigma brown, clearer at middle. Length, 8 mm.

Habitat—Ithaca, N. Y. Collected by Mr. R. L. Junghanns, a student in the Entomological Department of Cornell University. Described from four females, collected on Red Cedar (*Juniperus virginiana*).

Mailed November 3rd.

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SOME PSYCHODIDÆ FROM LONG ISLAND, N. Y.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Thomas Say described one species of Psychoda from the United States; Walker described another from Hudson's Bay; and Dr. Williston, in Entom. News, 1893, described a third species from New York. I have noticed in the vicinity of Sea Cliff, N. Y., seven species, only one of which I have identified as previously described. Most of the forms I have collected are probably common elsewhere in the Eastern States and in Canada.

All the forms known to me appear to be congeneric and belong to Psychoda. They have two veins between the forked veins, more or less pointed wings, and the second longitudinal appears to arise beyond the first basal cell. Pericoma, I should consider to consist of species with rounded wings and the second longitudinal arising before the anterior cross-vein. But Eaton, in his paper on the British species, has placed other forms under it; however, from his diffuse table it would be almost impossible to obtain any idea of the characters of Pericoma. I think it much better to use the terminology commonly used in Diptera rather than adopt one taken from another order. The species from Long Island are almost identical in venation, presenting 10 principal veins ending in the margin. The small vein at base is the auxiliary vein. The first longitudinal is simple, the second forked near middle of wing, the third forked close to the base, the fourth forked near middle, the fifth simple, and the sixth or anal consists of two branches. The two small cells at base, I should call the first and second basal cells, each bounded by the usual veins. All the veins are nearly straight, and at about equal distances apart, and bear many hairs. There is a fringe all around the wing, but longest on the posterior margin. The legs appear to be about of the same length and shape in all the species. The antennæ vary in length, and in some species are thicker in the males than in the females. The males have a superior and inferior pair of appendages, which consist of two or three joints.

I desire to thank Mr. A. D. MacGillivray, for kindly acquainting me with Mr. Eaton's classification of the British species.

The species may be tabulated as follows :—

1 { Wings grayish 2
  { Wings blackish 4

2 { Black dots at tips of some veins ..... *alternata.*
  { No dots 3

3 { At least two millimeters long ..... *cinerea.*
  { Less than two millimeters ..... *minuta.*

4 { Black dots at tips of some veins ..... *superba.*
  { No black dots, wings without white hair except in fringe 5

5 { Two distinct median patches of erect black hair, thorax black, fringe around apex whitish ..... *marginalis.*
  { Wings evenly black, fringe not whitish ..... 6.

6 { Thorax white and with white hair ..... *bicolor.*
  { Thorax black and with black hair ..... *nigra.*

Psychoda alternata, Say.

Body nearly white or slightly yellowish, with white and grayish hair; wings thinly clothed with gray hair, indistinctly showing a pale band at middle and one near base; spots of black hair at tips of veins 6, 8, and 10, and usually at ends of 2, 3, and 4; the fringe of gray hair which on posterior margin is three times as long as the width of a cell. Legs pale with white hairs. Antennæ slender and short, not as long as breadth of wing, quite thickly clothed with whorls of white hair; wings moderately narrow, acute at tip. The ♂ genitalia consist of two pairs of appendages; the inferior pair very slender, and as long as the diameter of the tip of the body, approximate at base, gradually separating and then strongly curving toward each other near tip, clothed beneath with long white hair; the superior pair quite wide apart at base, about half as long and less slender than the inferior pair, but little curved and with only short hair. The ventral plate of the ♀ is yellow, nearly twice as long as broad, with an emargination behind as deep as the plate is broad, the rounded branches slightly diverging; the ovipositor scarcely twice as long as the plate, slender and a little curved. Length of wing, 2. to 2.2 mm.

Common in July, on windows and on shrubbery near buildings; Sea Cliff, N. Y.

Psychoda cinerea, nov. sp.

Thorax and abdomen with long gray hair, a tuft of black hair at base of wing; wings with gray hair and fringe, the latter on the posterior margin nearly three times the width of a cell; legs pale with long, gray, and short white hair, and black scales on the tarsi. Antennæ slender, a little longer than the width of the wing, base of joints blackish, each joint with a whorl of white hairs; wings about as broad as in *P. alternata*, acute at tip. The inferior pair of ♂ appendages is long, contracted in the middle, swollen beyond, then growing slender and curving upwards, clothed beneath with white hair; the superior pair much shorter and curved downwards near tip, they are quite suddenly swollen near the middle. Ventral plate of ♀ as broad as long, slightly emarginate behind and with short scales, the ovipositor quite prominent and slightly curved. Length of wing, 2.1 to 2.8 mm.

Common on windows during June and July; Sea Cliff, N. Y.

This species is readily distinguished from the preceding by its slightly darker colour and by the uniform wings.

Psychoda nigra, nov. sp.

Black, with dark brown on the thorax and long black hair on the abdomen, wings evenly and quite thickly covered with long black hair, and with a black fringe, which on the posterior margin is about five times as long as the width of a cell; legs black, with very long black hair on outside of the tibiæ at base. Antennæ slender and a trifle longer than the width of the wing, clothed with white and some black hair, giving them a grayish appearance; wings narrower than in *P. alternata*, and very acute at tip, the posterior margin near tip being almost concave. The ventral plate of the ♀ is blackish, not much longer than broad, broadest at base, and barely emarginate at tip; ovipositor more than twice as long as plate and slightly curved. Length of wing, 2.1 mm.

One female, captured on a currant-bush at Sea Cliff, N. Y. Separated from all the other species by its uniform black appearance.

Psychoda minuta, nov. sp.

Dark, with whitish hair on thorax and gray on abdomen; wings thinly clothed with gray hair and a gray fringe, which at the posterior margin is about twice as long as the width of a cell; legs dark with whitish hair. Antennæ not quite as long as breadth of wing, black at base of joints, and each joint in male with a dense whorl of white, appressed hair, which

gives the antennæ a very heavy and thick appearance; in the female the whorls are quite loose. Wings much broader than in the other species, and more blunt at tip. The inferior pair of ♂ appendages are very long, slender, and gradually tapering, strongly curved upward and nearly black, with white hair beneath, the superior pair not half so long, tapering and diverging. Cannot make out the structure of the ♀ ventral plate. Length of wing, 1.6 mm.

Not uncommon on the bark of large trees in a damp woods, but difficult to capture; near Sea Cliff, N. Y.

Readily known by its small size, uniform gray colour and broad wings, which, when at rest, are folded roof-like over the body.

Psychoda superba, nov. sp.

Black, the thorax clothed in the middle with black hair, and on the sides with snow-white hair, in some cases it appears to be all white-haired; the abdomen with long, dense, black hair; the wings with blackish hair and patches of erect white hair, the tips of the posterior veins with a black dot and a white spot between them, some of the anterior veins also usually tipped with a black dot; most of the fringe on the anterior margin is black, but near tip and on posterior margin, gray or whitish, where it is four times as long as the width of a cell; the legs are black, with black hairs and scales and a few white scales at the tips of the joints. The ♂ antennæ are black, quite thick, shorter than the width of wing, with short black and longer gray, appressed hair; in the ♀ the antennæ are more slender and more sparsely clothed. There are a few patches of white hair on the head. The wings are quite broad, but hardly as acute at tip as in some species. The genitalia are not prominent, being concealed by the long black hair of abdomen. The inferior appendages of the ♂ are black, approximate, short and blunt; they are not much more than one-half as long as the diameter of the tip of the body, and but little up-curved; the superior pair are nearly as large, stout, and tapering to a point; they are wide apart at base, but curve toward each other. The ventral plate of ♀ is broad, yellow at tip, and broadly notched, but the notch is but one-half as deep as wide; the ovipositor is twice as long as plate and a little curved. Length of wing, 2.5 to 2.9 mm.

Common on the bark of large trees in woods. June. Sea Cliff, N. Y.

There is some variation in the arrangement of the white patches on thorax and wings; the legs and antennæ are wholly black, so I do not think it can possibly be a form of *P. Slossonæ*, Will.

Psychoda marginalis, nov. sp.

Black, head and thorax with white hair, but not very dense; abdomen with black hair, and often a small patch of white hair each side at tip; wings thinly clothed with black and gray hair, and some scattered white ones near base, two prominent patches of erect black hair just beyond the middle of the wing; the fringe dark gray, except near the tip on each side, where it is whitish, giving the appearance of a white margin to a black wing; it is very long, on the posterior margin nearly as long as the breadth of the wing; legs dark with gray hair. Antennæ slender, black, with whorls of gray hair, about as long as the width of wing; wings narrow, acute at tip. The inferior pair of ♂ appendages are long and slender; at first they are parallel, then they diverge and curve upward; they are clothed with fine black hair; the superior pair are very far apart at base, about two-thirds as long as the inferior pair, gradually tapering and but little curved toward each other. Length of wing, 1.8 to 2 mm.

Not uncommon on low herbage near the edge of a swamp. June. Sea Cliff, N. Y. All my specimens seem to be males.

Easily recognized by its general black colour, two black patches on wing, and the apical white fringe.

Psychoda bicolor, nov. sp.

Head and thorax yellowish-white, abdomen black, the former with white, the latter with black hair; wings with black hair, most dense toward base and on costa; fringe black or dark gray behind, where it is about three or four times as long as the width of a cell; legs black, with black hair; antennæ slender, slightly longer than breadth of wing, black, with whorls of dark gray hair; the wings are broader than usual, very oblique behind, and acute at tip. The inferior ♂ appendages are three-jointed, the basal joints nearly united, the second joint tapering and curved upward, about as long as the first joint, at tip with a short, recurved, pointed joint; superior appendages two-thirds as long; widely separated, curved downward, slender at tip. Length of wing, 2.4 mm.

Not uncommon in the same locality as *P. marginalis*; only males known to me. Distinguished by its general black colour, except white head and thorax.

A NEW PERICOPID AND SOME NEW ZYGÆNIDÆ FROM CUBA.

BY B. NEUMOEGEN, NEW YORK.

My esteemed friend, Dr. L. Gundlach, has left to me the task of describing several new Bombyces, which he discovered within the last few years in Cuba. Some of the specimens which are uniques, are, unfortunately, in such a poor state that a thorough description was well-nigh impossible. In one case I had to refrain entirely, on account of the dilapidated condition of the insect. All the types belong to the *Museo Cubano Zoologico de Gundlach*, lately acquired by the Spanish Government.

Daphne, nov. gen.

Head well developed. Eyes large, hairy. Clypeus indentated. Palpi prominent, outwardly curved. Antennæ large, bipectinate, tapering at tip. Legs scaled, the tibiæ well armed and with a large hairy tuft. Abdomen long, slender and tapering. Primaries nearly double as long as broad. Exterior and interior margins rounded. Subcostal nervure arcuated near apex. Median nervules equi-distant. Submedian parallel with interior margin. Secondaries, margins well rounded, 7-veined. Costal nervure curvilinear. The ornamentation is black and steel blue, the veins blackish. The genus is allied to *Gnophæla*, Wlk., and should stand at the head of the Pericopinæ.

Daphne cyanomela, nov. spec.

Head, prothorax and abdomen of bright orange colour. Palpi the same, with black edges above. Eyes and antennæ black. Anal tuft somewhat paler than abdomen. Legs grayish black. Thorax and wings rich metallic blue. Black costa and black broad marginal bands on both wings, reaching to centre of inner and anal margins respectively. Fringes grayish black.

Below the same as above.

Expanse of wings: 46 mm. Length of body: 15 mm.

Type, ♂. No. 131, M. C. Z. de G.

Phaio, nov. gen.

Head and eyes large. Tongue well developed. Antennæ long, bipectinate, somewhat tapering at tips. Front prominent, pilose. Thorax pilose, with large patagiæ. Primaries very long and well drawn

out, more than twice as long as broad. Costa nearly straight, but somewhat curved inwardly at centre. Apices pointed. Exterior margin slightly bent angles, and interior margin somewhat sinuous at centre. Secondaries small, about as broad as long, sharply pointed at apices, and well rounded at anal angle. Abdomen long and well developed, rounded at anus. Legs long and slender.

Phaio longipenuis, nov. spec.

Eyes whitish yellow. Head black. Antennæ shortly pectinated, black, the outer edge and tip being bright yellow. Above thorax and abdomen dark blue, and all wings of blueish-black, fringes concolorous.

Below, wings as above, with red basal dots. Abdomen blackish, with a very peculiar black shield fringed with white hair, and having a yellow lateral dot, covering area of two basal segments. Legs yellow, with exception of coxæ, which are red above and black below.

Expanse of wings : 48 mm. Length of body : 14 mm.

Type, ♂. M. C. Z. de G.

A very peculiar, and in its fresh state, undoubtedly a brilliant insect. I should place it in the Zygaenidæ, between *Illipula*, Butl., and *Ixylasia* Butl.

Cosmosoma Juanita, nov. spec.

The specimen is not very good, and the antennæ are entirely missing. Head and eyes black. Palpi yellowish. Thorax and patagiæ black, the latter with white edges. The slender abdomen above is bright red, with basal two segments and anal segment of black colour, with anal black tuft. Below, bright red, with exception of black anal segment and tufts. Legs red, with white stems at coxæ.

Wings, above and below, vitreous, with black nervules. A broad marginal black band on primaries, forming a large black apical space, and tapering off at angle. Small black marginal bands on secondaries.

Expanse of wings : 23 mm. Length of body : 8 mm.

It is to be regretted that the specimen is not in a better state, the secondaries being nearly entirely demolished. When fresh, it must be a beautiful little insect.

Type, ♀. No. 132, M. C. Z. de G.

It comes very near *C. selecta*, Herr. Sch., but is easily distinguished by the absence of the black discal spots on primaries, and the different ornamentation of the body.

SOME LITTLE KNOWN SPECIES OF ŒNEIS.

BY H. J. ELWES, COLESBORNE, CHELTENHAM, ENG.

On page 224 of CANADIAN ENTOMOLOGIST, Volume XXVI., Mr. Herman Strecker has some remarks on Chionobas, in which, I am glad to say, he supports my views, except in two points. First, with regard to the *subhyalina* of Curtis, I cannot conceive on what grounds he supposes that the description of *subhyalina* refers to *Erebia fasciata*, and as W. H. Edwards's suggestion that the example from Guenée's collection sent to me by Oberthur as the type of *subhyalina* is not really so, rests on no evidence whatever; I still maintain that *subhyalina* is the proper name for the insect hitherto called *crambis*, Freyer, found, as far as we know at present, from Newfoundland along the Labrador coast to Hudson's Straits and other parts of Eastern Arctic America. It has no resemblance to *Beanii*, Elwes, first sent out under the name of *subhyalina*, by Mr. Bean, and only taken near Laggan. With regard to *alberta*, Mr. Strecker had probably written his notes before seeing W. H. Edwards's further remarks on this species, on page 192 of the same volume. If he had seen the true *alberta*, I do not think he could have supposed that it is a variety or form of *chryxus*. The one species is found in May only, on the prairie; the other always in the mountains, in pine forest, or above timber line, and does not appear, as far as I know, before about the 20th June. One has a well-marked sexual patch on the forewing in the male, the other has no trace of it. The smallest specimens of *chryxus* are considerably larger than the largest of *alberta*. The colour is also totally different on both surfaces, so I can only suppose that Mr. Strecker has never seen *alberta*. I have now received more specimens, including several females, from Mr. Wolley-Dod, and though the variation in colour and number of ocelli is even greater than W. H. Edwards points out, there is not the slightest difficulty in separating any single specimen from any specimen of my large series of *chryxus* and *varuna*. With regard to the latter, a number of specimens sent by Mr. Wolley-Dod, also taken near Calgary, confirm my opinion that it cannot be separated from *Uhleri*, even as a local variety, for though the majority of the specimens have larger and more abundant ocelli than *Uhleri*, from Colorado, there are several which I could not distinguish without the labels. As a rule, however, the band on the under side of the hind wing is better marked in the northern than in Yellowstone or Colorado specimens.

With regard to the single female from Mount Graham, for which Mr. Strecker suggests the name of *Laura*, I can form no opinion whatever.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

VI. The Endomychidæ and Erotylidæ of Ontario and Quebec.

These two families immediately follow the Coccinellidæ in our lists, and are evidently related to them in many respects, the former, perhaps, the more closely, especially in tarsal structure. In habits there are, however, wide differences, the Coccinellidæ, as already stated in a former paper, being chiefly aphidivorous, while the Endomychidæ and Erotylidæ are mostly fungivorous.

Taking up the groups separately, we may consider the Endomychidæ first. These may be defined as Coleoptera, usually rather small in size, less convex and more elongate than typical Coccinellæ, and differing also in having much longer antennæ, the last three joints of which form a distinct club. The tarsi are four-jointed, the third joint often minute and anchylosed to the fourth. The claws are simple, the first ventral segment without coxal lines; the elytra cover the dorsal segments and the wings are without long fringes. The larvæ of the more typical genera, such as *Epipocus* and *Aphorista*, are moderately elongate, only slightly convex, scaly above, the sides of the body with appendages as shown in the figure (fig. 53, larva; fig. 54, pupa of *A. vittata* after Smith). That of *Mycetæa* is, however, of a different shape, as shown by Westwood, who figures it as of elongate form, the segments with deeply incised sutures and armed laterally with numerous bristles, the terminal segment with about nine bristles along the hind margin.

Fig. 53.

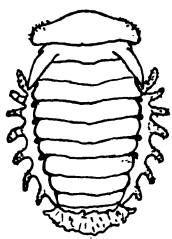

Fig. 54.

The Endomychid genera found in the provinces named may be thus known :—

A. Tarsi distinctly four-jointed; smaller species.

b. Body oval, pointed behind; surface pilose ..... *Mycetæa.*

bb. Body oblong, or subparallel; surface glabrous.

Elytra black, shoulders and apex red; thorax unspotted.. *Rhanis.*

Elytra reddish or yellowish, with two black fasciæ; thorax with black spot..... *Phymaphora.*

AA. Tarsi apparently three-jointed ; larger species.

c. Thorax and elytra uniformly piceous-black above, except the obscurely ferruginous margin.....*Lycoperdina.*

cc. Thorax black, elytra red, each with 2 black spots.*Endomychus*

ccc. Thorax reddish, elytra black, each with two red spots..... *Mycetina.*

cccc. Thorax variable, elytra striped.

Above pubescent.....*Epipocus.*

Above glabrous.....*Aphorista.*

Only one species of each of these genera has been reported in the Canadian lists, but a short descriptive note is appended in order that should others be found they may be recognized as new to the fauna and accorded further study.

MYCETÆA, Stephens.

M. hirta, Marsh., occurs both in America and Europe. I have seen no specimens, but it is described by Stephens as being a rusty red insect of small size (about .06 in.), and oblong-ovate, convex form, the antennæ and legs pale dull red ; the elytra are deeply sub-seriately punctured and pilose. It is found in fungi or on grassy banks.

RHANIS, Lec.

The only species, *R. unicolor*, Ziegl., is narrow, elongate, nearly glabrous, shining, about .14 in. long ; the colour is reddish, the elytra black with the shoulders often indistinctly and the apex very broadly red.

PHYMAPHORA, Newm.

P. pulchella, Newm., is a beautiful little species ; .15 in. long, elongate in form, the thorax red with discoidal black spot, the elytra reddish with two transverse black fasciæ, the anterior of which is very broad and nearly median in position, the other less distinct and nearly or quite apical. The male antennæ have an immense club.

LYCOPERDINA, Latr.

A neat piceous-black species, .19 to .21 in. long, the margin of the body and the legs more or less distinctly brownish-red, is *L. ferruginea*, Lec. It may be found under stones or logs early in the spring and on fungi later in the season.

APHORISTA, Gorham.

A. vittata, Fabr. (fig. 53, larva; fig. 54, pupa; fig. 55, beetle), is a smooth shining insect, about a quarter of an inch in length, in colour reddish above, the elytra with a common sutural black stripe, and each with a shorter lateral one. The antennæ are nearly black.

Fig. 55.

MYCETINA, Muls.

The little *M. perpulchra*, Newm., belongs here, and well deserves the name. It is .16 in. long, the head is black, the thorax red, either with or without a discoidal vitta. The elytra are black, each with two red spots, the anterior subhumeral in position and transversely elongate in form. This species is represented in fig. 56. *M. Hornii*, Cr., will doubtless be taken in British Columbia, and differs in having a triangular humeral spot.

Fig. 56.

EPIPOCUS, Germ.

Probably through error, the Texan *E. cinctus*, Lec., is in the Canadian lists. It is a large ferruginous pubescent species, .4 in. long, the thorax with four black marks, the elytra with the disk (except sometimes the sutural region) black. In Texas I have found it under logs near fungi and have described and figured the early stages, which resemble those of *Aphorista vittata*.

ENDOMYCHUS, Panz.

Fig. 57.

E. biguttatus, Say (fig. 57), has the thorax black, the elytra red, with two black spots on each, the posterior larger. Length, .16 in.

The *Erotylidæ* are allied to the *Endomychidæ*, but the tarsi are four or five-jointed, never three-jointed, as is apparently if not actually the case in the latter family. The pronotum has not the sub-basal transverse impression and two longitudinal lines so often seen in the Endomychidæ, and the form is usually more elongate and more convex. Comparatively little is known of the larvæ of our native species; that of *Languria* (fig. 58, *Languria Mozardi* in all stages) is elongate, and, in the species figured, about .32 in. long; the form is sub-cylindrical, only the anal segment being narrower than the preceding joint; the colour is light yellow, the mandibles and anal horns (which are acute and curved upwards) brown. It feeds in the stems of clover, and

may do noticeable damage. The larva of *Tritoma humeralis*, Fabr., is nearly white, the head yellowish, the form moderately elongate, nearly cylindrical, but tapering to each end, the ninth segment with two short, erect, slightly recurved hooks or processes; it lives in fungi, going under ground to pupate, remaining in this state eight days. The pupa is .20 in. long, very bristly and with a stout spine on the tip of the abdomen.

The genera are not in all cases readily separable by a beginner, being sometimes (as in *Tritoma* and *Mycotretus*) much alike in general form and appearance; however, a careful attention to the specific descriptions ought to do away with any doubt that may arise. The following table will show the points of difference in the Erotylid genera and enable those found with us to be recognized.

Fig. 58.

A. Form very elongate, parallel, front coxal cavities open...*Languria.*

AA. Form more robust, front coxal cavities entire.

b. Tarsi distinctly five-jointed.

Size small (.12 in.).....*Dacne.*

Size large (.50–.80 in.).....*Megalodacne.*

bb. Tarsi apparently four-jointed, the fourth joint very small.

c. Last joint of palpi widely securiform, thorax with black spots.....*Ischyrus.*

cc. Last joint of palpi oval or slightly triangular. Thorax unspotted.

Middle area of mentum large, transverse...*Mycotretus.*

Middle area of mentum small, triangular.....*Tritoma.*

LANGURIA, Latr.

The species of this genus are found under logs and stones early in the spring, later they may be swept from plants. Two species, one of which divides into two varieties, are known from our region.

Thorax red, elytra bluish or greenish (.22–.31 in.).....*Mozardi*, Latr.

Thorax red with discoidal dark stripe (.35–.40 in.)...*gracilis*, Newm.
Thorax entirely greenish-black. .....*v. inornata*, Rand.

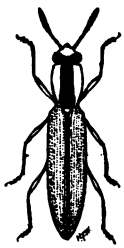

Fig. 59.

We give figures of *L. Mozardi* in all stages (Fig. 58) and the beetle of *L. gracilis* (Fig. 59). I have a specimen of *L. convexicollis*, Horn, with the label "B. C." It may be known from *L. Mozardi* by the larger size (.47 in.) and the entirely black under surface.

DACNE, Latr.

A small, black insect (*Dacne 4-maculata*, Say,) .12 in. long, the clypeus and a humeral and apical spot on each elytron reddish or yellowish, represents this genus. At times the apical spots may extend over the entire tip of the elytra.

MEGALODACNE, Crotch.

Two very fine species of this genus are found in Canada. They are large insects with black thorax, the elytra banded with black and orange-red in a manner recalling certain carrion beetles (*Necrophorus*), and are found in fungi. The two Canadian species resemble each other very closely, differing thus :—

Fig. 61.

Smaller (.50–.60 in.). Elytra finely seriately punctate, thorax shorter... .....*fasciata*, Fabr.
Larger (.64–.80 in.). Elytra not punctate (Fig. 60).....*heros*, Say.

Fig 60.

ISCHYRUS, Lac.

I. quadripunctatus, Oliv. (Fig. 61), is about .30 in. long, black beneath, the side margins of thorax and abdomen marked with yellow or reddish. Above it is fulvous, the head black, the thorax with a series of four transverse spots across the middle, the elytra with black bands and spots as shown in the figure.

MYCOTRETUS, Lac.

Small red and black insects found on fungi or dead wood. Two species with one varietal form occur here and may be known thus :—

Thorax black, scutellum and elytra red (.16–.18 in.).*sanguinipennis*, Say.
Thorax and scutellum black, elytra bicolored.
Apical third of elytra obliquely black. (.14 to .16 in.)..*pulchra*, Say.
Black mark on elytra, angulate anteriorly.....*v. dimidiata*, Lac.

TRITOMA, Fabr.

Some of the species of this genus are very common in fungi during the summer and autumn ; they resort to such places for the purpose of laying eggs which produce the somewhat maggot-like larvæ previously described. The beetles may be separated by the appended table :—

A. Entirely black above. (.16–.20 in.)..... ..... *unicolor*, Say.

AA. Above bicolored.

b. Elytra with humeral reddish spot, (.10–.16 in.)..*humeralis*, Fabr.

bb. Elytra with broad, central, reddish-yellow band. (.18–.20 in.) ..... *festiva*, Lac.

bbb. Elytra unicolorous, black or bluish, thorax reddish.

c. Body beneath reddish.

Antennæ entirely black, elytral interstices obsoletely punctulate. (.22 in.)..... .....*macra*, Lec.

Antennæ black, red at base, elytral interstices very evidently though sparsely punctate. (.18–.20 in.)..... .....*thoracica*, Say.

cc. Body beneath black. (.12–.16 in.)..... .... *flavicollis*, Lac.

Fig. 62.

Fig. 63.

We give figures of *T. humeralis* (Fig. 62, the larva, and Fig. 63, the beetle). The last four species are of more elongate form.

The chief papers bearing on the North American species are as follows :—

1853. Leconte, J. L. Synopsis of the Endomychidæ of the United States. Proc. Acad. Nat. Sci. Phil., VI., pp. 357–360.

1854. Leconte, J. L. Synopsis of the Erotylidæ of the United States. Proc. Acad. Nat. Sci. Phil., VII., pp. 158–163.

1858. Gerstæcker, A. Monographie der Endomychiden, Leipzig, pp. xiv. + 433, 3 plates.

1873. Crotch, G. R. Synopsis of the Erotylidæ of Boreal America. Trans. Am. Ento. Soc., IV., pp. 349–358.

1873. Crotch, G. R. Synopsis of the Endomychidæ of the United States. Trans. Am. Ento. Soc., IV., pp. 359–363.

A NEW ATTID SPIDER FROM JAMAICA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Saitis Annæ, n. sp.—Length 3½ mm.; width of abdomen, 1 mm. Cephalothorax, about as long as, but perhaps not quite so broad as abdomen. Abdomen broadly oval. Cephalothorax, about 1½ times as long as broad; broadest between 2nd and 3rd rows of eyes. General colour grayish brown, not metallic.

Cephalothorax with a broad black V, the truncate base of which corresponds to the base of the cephalothorax; and the arms extend forwards and outwards to the border between the latitude of the 2nd and 3rd rows of eyes.

Abdomen above with a black V-shaped mark on its posterior half, pointing towards its tip. In the V-mark of the cephalothorax, the arms become attenuate; but in this abdominal V-mark, the base is attenuate and the arms become greatly broadend towards their truncate ends. This V is bordered posteriorly on each side by a conspicuous patch of white hairs, and at the truncate ends of the arms, in striking contrast with the black, is on each side a white (or dirty white) patch, surrounded in front by a dark ring. On the side of the abdomen, below this patch, starts a whitish band, running forwards. Between the arms of the V are obscure markings which faintly indicate the arrow-head marks of such species as *Neon Nellii*, *Zygoballus Bettini* and *Hasarius Hoyi*. On the anterior half of the abdomen, the subdorsal region presents a band, bordered inwardly (dorsad) by whitish marks.

Legs ringed at intervals with blackish.

The terminal portion of the palpi is red-brown, becoming black at the end, but the middle portion bears a tuft of very conspicuous shining white hairs, which in certain lights appear yellowish-silvery. The front of the cephalothorax, below the eyes, also bears some silvery hairs; and there are whitish rings round the anterior eyes.

Middle eyes almost touching, outer eyes of first row almost touching them. Diameter of outer eyes about half that of middle eyes. Eyes of second row very small.

Sternum black, oval. Coxæ shining, translucent, hind coxæ close together.

Hab.: Manchester Cottage, Kingston, Jamaica, Feb. 26, 1893, among dead leaves. The type specimen is with Mr. Peckham.

I described this species when it was found, about 18 months ago, and named it after my wife. The description has remained in MS., as I expected that Mr. Peckham would publish the species, but he now states that he will not be writing on the group to which it belongs at present, and advises me to proceed.

This appears to be the third Attid recorded from Jamaica (the other two being *Anoka Peckhamii*, Ckll., and *Menemerus melanognathus*, Lucas, of which the former is endemic, but the latter cosmopolitan in the tropics), but possibly a dozen more have been collected, and will be described in course of time by Mr. and Mrs. Peckham.

P. S. to p. 284. Although it has nothing to do with the present subject, it will be well to mention here that the food-plant of *Tachardia cornuta*, Ckll., proves to be *Parthenium incanum*, H. B. K.

ENTOMOLOGICAL NOTES.

BY PROF. C. H. FERNALD, AMHERST, MASS.

In the CANADIAN ENTOMOLOGIST, Vol. 26, page 184, the Rev. Thomas W. Fyles described a moth as new, under the name of "*Botys urticaloides*." Mr. Fyles has been so kind as to lend me his type for examination, and it proves to be identical with *Metrea ostreonalis*, described by Grote in "Papilio," Vol. 2, p. 73, where he states that the type was taken by Mr. L. W. Goodell, in Amherst, Mass., and that he also had a New York specimen in his collection. I have seen the Grote specimen, and also another one taken in Bangor, Maine, by Mr. Fred. Eddy. The habitat of the specimen in the National Museum, mentioned by Mr. Fyles, is not given, and perhaps is not known. It is, undoubtedly, a rare species at present, as these are all that are known to me.

The genus Botys (not Botis, as Swainson and some others have written it) was established by Latreille, in 1805, in his Histoire Naturelle des Crustaces et Insectes, Tome 14, page 230, under which he placed *purpuraria* and *potamogata*. The former of these species is a geometrid moth, and has been placed in Huebner's genus *Lythria*. The second species, *potamogata*, is not the species of Linneus by that name, but *stagnata*, Don.

In 1802, Schrank established the genus *Nymphula* in his Fauna Boica, with *potamogalis* as the type, but this has also proven to be *stagnata*, Don; therefore, the genus *Botys* of Latreille, if *purpuraria* be taken as the type, must be referred to the Geometridæ; but if *stagnata*, Don., be taken as the type, it must fall as a synonym of *Nymphula*, Schr. In either case we have no right to use it as a genus of the Pyralids, and for this reason I did not use it in Smith's List of the Lepidoptera of Boreal America, nor have Meyrick and Ragonot used it in their late works on the Pyralids.

LIST OF THE DRAGONFLIES OF CORUNNA, MICHIGAN.

BY D. S. KELLICOTT, COLUMBUS, O.

Corunna is the capital of Shiawassee County, in the central part of the Lower Peninsula, and approximately in 43° north latitude. The town is situated on the Shiawassee River, which traverses the county and enters the Saginaw, as a chief branch. At present there are very few permanent small streams and ponds in the vicinity, but a mill-dam across the river at the town causes sluggish, deeper water for a mile or more. This stretch of water is locally known as the "Pond." It abounds in aquatic life, thus affording the most favourable conditions for the nymphs of the "snake feeders." The collections on which this list is based were made about this "pond," and for a mile along the river below. The time of collection extends from June to September, and I feel confident that few species remain undiscovered. The list, therefore, fairly represents the Odonata of a favourable inland locality in Central Michigan.

It has occurred to me, again and again, how restricted many species are in their flight. In consequence, an abundant species of a given district may be wholly overlooked by the collector, if its special habitat is not discovered. For example, certain species occur almost exclusively at the "pond," others by the river, whilst still others are equally common in either situation. Thus, the emerald-eyed *Macromia Illinoiensis* is numerous about the rapids of the river, but is seldom seen at the "pond," whilst *Libellula incesta* is common at the latter, and as rarely seen by the former. Other illustrations will be given in notes under the several species.

The systematic arrangement followed is that of Philip P. Calvert, in the "*Catalogue of the Odonata of Philadelphia.*" The specimens are in the collection of the Ohio State University.

CALOPTERYX, Leach.

Maculata, Beauv.—Common in former years along the river and small streams. It is now seldom seen, owing, I think, to the draining of morasses and ponds, and the consequent drying up in summer of the meadow brooks.

Apicalis, Burm.—Rare, about the river.

HETÆRINA, Hagen.

Americana, Fabr.—Exceedingly abundant in August, by the river, especially where it flows rapidly over beds of bowlders and the margins are overhung by the long, coarse tussock grasses and the silvery sprays of the willow.

LESTES, Leach.

Unguiculata, Hagen.—Not uncommon.

Uncata, Kirby.—Common.

Disjuncta, Selys.—Less common than the preceding.

Rectangularis, Say.—Abundant.

Vigilax, Selys.—Fairly common.

Inequalis, Walsh.—Rare.

The first four species occur among the herbage of low lands and meadows, often long distances from the streams; the last two, on the other hand, are seldom seen away from the lily pads or bordering flags and rushes.

ARGIA, Rambr.

Putrida, Hagen.—Abundant.

Violacea, Hagen.—Abundant.

Tibialis, Rambr.—Not common.

Apicalis, Say.—Not common.

NEHALENNIA, Selys.

Posita, Hagen.—Not uncommon.

ENALLAGMA, Charp.

Civile, Hagen.—Few seen first week in August.

Ebrinus, Hagen.—Rare.

Divagans, Selys.—Common on the pond, resting on floating aquatics.

Exsulans, Hagen.—Abundant.

Signatum, Hagen.—Common. The last week in August it was the only abundant species of the genus.

ISCHNURA, Charp.

Verticalis, Say.—Exceeding abundant. The orange female is common.

HAGENIUS, Selys.

Brevistylus, Selys.—Common, July and August.

GOMPHUS.

No species of the genus has been taken in the locality; *G. vastus*, *exilis*, *fraternus* and *villosipes* are known to occur a few miles south.

DROMOGOMPHUS, Selys.

Spinosus, Selys.—Common in July; disappears about the 1st of August.

EPIÆSCHNA, Selys.

Heros, Fabr.—Not common.

FONSCOLOMBIA, Selys.

Vinosa, Say.—Rare. One taken July 31.

ÆSCHNA, Fabr.

Constricta, Say.—Abundant.

Clepsydra, Say.—Much less common than *Constricta*.

ANAX, Leach.

Junius, Dury.—Abundant.

MACROMIA, Rambur.

Illinoiensis, Walsh.—Common along the river and in open groves at considerable distances from the water.

EPICORDULIA, Selys.

Princeps, Hagen.—Common.

LIBELLULA, Linné.

Basalis, Say.—Very abundant.

Incesta, Hagen.—Common about the "pond" in July.

Quadrimaculata, Linné.—Rare.

Semifasciata, Burm.—Rare.

Pulchella, Drury.—Abundant.

PLATHEMIS, Hagen.

Trimaculata, De Geer.—Common.

CELITHEMIS, Hagen.

Eponina, Drury.—Not common.

LEUCORHINIA, Brittinger.

Intacta, Hagen.—Common.

DIPLAX, Charp.

Rubicundula, Say.—Very abundant.

Obtrusa, Hagen.—More abundant than the preceding.

Semicincta, Say.—Not common.

Vicina, Hagen.—Abundant.

PERITHEMIS, Hagen.

Domitia, Drury.—Not common about the "pond."

MESOTHEMIS, Hagen.

Simplicicollis, Say.—Abundant.

PACHYDIPLAX, Brauer.

Longipennis, Burm.—Abundant.

NOTES ON ALYPIA MARIPOSA.

BY JOHN B. LEMBERT, YOSEMITE, CAL.

Food plant.—*Clarkia elegans*, etc.

Egg.—Shaped like a white table squash without the scollops ; usually laid on the flower buds, the young larva feeding inside on the parts of the flower ; hatched in eight to eleven days.

First Stage.—Head bilobed, glossy black ; body smooth, with a few fine bristles, when emerging dark on the upper side, which shade disappears, leaving the body a pale amber in a few hours ; from the third segment the body slopes at an angle of forty-five degrees to the anal claws, which gives the third segment a humped appearance ; the thoracic legs, six in number, are black ; eight abdominal legs and two anal claws, the latter light with dark lines surrounding them. Length, 2 mm. This stage lasted three days, with one day more for moulting.

Second Stage.—Head bilobed, with a few bristles ; colour black and glossy, with light marks appearing about the head ; the body darker amber coloured, with pointed tubercles, each having a light-coloured bristle protruding from it ; the thoracic legs black ; legs and claws as in former stage. This stage lasted three days, with one more for moulting. The larva looped in both stages when walking, but ceased to do so in the next stage. Length, 3 mm.

Third Stage.—Head as before ; a white, bell-shaped spot in the centre, with two narrow short bands on each side of the head, one over the mouth parts ; a white line down the back, below this a dull dark band on each side, below these a white band, then a dark band running along the legs from the head to the anal claws ; tubercles black, round and pointed at the tip, bristle light and fine, becoming longer in each stage ; thoracic legs, abdominal legs and claws black. This stage lasted three days, with one day more for moulting. Length, 5 mm.

Fourth Stage.—Head bilobed, the white band joining over the centre of head above the bell-shaped spot ; the rest of the body as in the former stage. This stage lasted three days, with thirty hours in moulting. Length, 9 mm.

Fifth Stage.—Head as before, the white band broader, more distinct and longer than the others in proportion ; the first thoracic segment white with eight black round dots near the neck and a black narrow band back of the white, becoming yellow on the top of the segment, enough to cover four of the black dots, the body markings increasing in breadth, the white

bands on each side covering two longitudinal rows of tubercles; in the upper row a minute dot appeared in front of each tubercle, and two buff-coloured spots appeared in two upper dark longitudinal bands on the third segment, one on each side of the white line. Thoracic legs black, abdominal legs black, shielded on the outside; the claws have white and buff-coloured markings; the abdomen from the last pair of thoracic legs down the ventral surface to the claws has triangular joined markings; between the claws and abdominal legs are two lateral rows of short bristled tubercles, and between the abdominal and thoracical legs are two more rows. This stage lasted eight days, and three and three-quarters more for moulting. Length, 13 mm.

Sixth Stage.—Head and first segment as before; instead of dark longitudinal bands, irregular ovate, reniform and heart-shaped markings appeared on and between each segment; there were three wedge-shaped markings, one of them joining the other markings, altering their shape somewhat, with a wine-coloured surrounding about all these markings, there being two such rows on each side of the white dorsal band, a black line in the suture in front of third last segment and one in the suture above the claws, which are now of an amber colour with firm black line on the outer rims of the joints, the abdominal legs similarly marked and coloured, the posterior thickly marked with buff and white; instead of a dark band above the legs, there were three dots on each segment and above the legs some were single and others joined to resemble a heart form. The predominating colour white as the larva matured. This stage lasted seven and a-half days. Length in twenty-four hours after moulting, 24 mm.; when mature, 39 mm. At noon of the eighth day the larva ceased feeding, after evacuating all the solid food. Towards sundown it picked out a place to gnaw out a hibernaculum in rotten wood; finding its mandibles too tender for the work, the larva crawled up on the cork of the glass jar and rested for the night; about 8 a.m. it came down again on the wood to the place it had selected, and began steadily to work with its mandibles to excavate a round hole, and as long as it could the powdered material was raked out with its thoracic legs; afterwards, as the hole grew deeper. the powdered rotten wood was lifted up with the back of its head and neck by bending these in a hook form; by 1 p. m. the hole was complete; the larva then turned round and commenced to gnaw around the mouth of its hibernaculum, raking some inside, and then afterwards it formed a rim until it was just able to draw in its head, then the powdered wood was

lifted up, and with a mucilagenous matter the wood was mixed and cemented, and the mouth of the hibernaculum was sealed up by 2 p. m. As long as the seal was soft, the larva's efforts could be plainly seen keeping it up with its mouth parts. On the third and fifth day I found the larva was in the same condition as when it entered. On the seventh day I opened the hibernaculum further back—the larva had cemented the other places—and found that it was a larva still. On the tenth day, however, the larva had pupated.

Pupa.—Colour reddish-brown over the wing parts and abdomen ; over the head parts and upper and lower sides of the thoracic region, of a darker shade. The proboscis case prominent ; the neuration of the wings plainly visible. On each side of the abdomen are seven black round and raised spots, which are glossy white, the rest is finely granulated. Cremastral spines and a flattened area at the end of the abdomen, black. Length, 15 mm.

NOTES ON QUEBEC COLEOPTERA.

BY A. W. HANHAM, WINNIPEG, MAN.

These notes relate chiefly to species taken in the vicinity of Quebec City, all to species taken in the Province of Quebec during 1892–1893. I am greatly indebted to Mr. W. H. Harrington for the identification of many of the following :

Cicindela longilabris, Say. June 5 and 8. Fort woods, Levis.

Cicindela limbalis, Kl. (Two.) Aug. 28. Near Lake Beauport.

Cicindela hirticollis, Say. (One.) Aug. 28. Near Lake Beauport.

(*C. repanda*, *C. purpurea* and *C. vulgaris*, very abundant on this date.)

Cychrus Lecontei, Dej. Spring and Fall, abundant under dead leaves in damp woods. St. Romauld's, May 8, seven captured on wooded hill side. Gaspé Basin, May 14, a pair.

Carabus serratus, Say. Aug. 22. St. Joseph's de Levis. A pair under stones on hill side.

Blethisa Julii, Lec. May 10. One specimen in road near Fort No. 1, Levis. Aug. 13. Same locality, four, dug out of earth under thick, dry moss, edge of woods. Associated with this beetle were numbers of *Platynus cupripennis*, Say.

Notiophilus sibiricus, Mots? Aug. 13; Sept. 10, 17, 24; Oct. 30, etc. Isle d'Orleans. Under dead leaves, damp spots in woods; generally in pairs.

Trechus rubens, Fab. Oct. 15. Isle d'Orleans. A pair in dead leaves, edge of woods.

Pterostichus Luczotii, Dej. May 14. Gaspé. Several.

Cymindis cribricollis, Dej. May 15. Gaspé. Common at Quebec.

Brachylobus lithophilus, Say. (One.) Aug. 13. Fort woods, Levis.

Bradycellus cognatus, Gyll. (One.) May 20. Gaspé.

Quedius molochinus, Grav. May 8. St. Romauld's. Under dead leaves, wooded hill side.

Staphylinus fossator, Grav. (One). Aug. 10. Isle d'Orleans.

Choleva clavicornis, Lec. May 27. Isle d'Orleans. A few specimens in the shell of a dead *Mesodon dentiferus*, Birm.

Adalia frigida, Schn. Fall. Isle d'Orleans. One in dead leaves.

Cytilus trivittatus, Melsh. May 15. Gaspé.

Byrrhus americanus, Lec. June 8. Several in ruts of sandy road through open woods.

Campylus denticornis, Kirby. June 11. A small specimen, by beating, woods near St. David's.

Oestodes tenuicollis, Rand. One or two early in the year in the city.

Oestodes, sp. (perhaps *puncticollis*, Horn.) (One.) June 25. By beating, woods near St. David's.

Corymbites resplendens, Esch. June 11th. One specimen, living, under horse droppings on sandy road through woods, near St. David's.

Corymbites æripennis, Kirby. (One.) May 13. Isle d'Orleans. In dead leaves. Sept. 3. A pair under log near St. Joseph's.

Corymbites spinosus, Lec. (One.) June 11. By beating, woods near St. David's.

Corymbites triundulatus, Rand. May 18; June 11, etc. Fairly common.

Eros coccinatus, Say. (One.) June 11. By beating, woods near St. David's.

Geotrupes Egeriei, Germ. Isle d'Orleans. Aug. 30. Burying around fungus. Sept. 10, 24, and Oct. 1. Very abundant, crawling across road through woods, or resting in the sun.

Geotrupes Blackburnii. Fab.? Aug. 10. Isle d'Orleans. Several in manure.

Hoplia trifasciata, Say. June 11. Plentiful on blossom, woods near St. David's.

Rhagium lineatum, Oliv. June 11. One specimen off pine stump, same locality.

Anthophilax malachiticus, Hald. Isle d'Orleans. A dead specimen picked up in woods, May 26.

Achmæops pratensis, Laich. June 11, etc. In great variety and abundance, by beating off blossom.

Leptura zebra, Oliv. (One.) July 16. By beating, woods near St. David's.

Leptura chrysocoma, Kirby. June 25; July 9, 13, etc. This handsome "long-horn" is often to be met with on the flowers of *Chrysanthemum leucanthemum.*

Leptura proxima, Say. July 16. By beating, woods near St. David's.

Leptura vibex, Newm. June 11. A few by beating, woods near St. David's.

Saperda cretata, Newm. Aug. 6. Isle d'Orleans. One specimen off thorn.

Adimonia rufosanguinea, Say. May 18. Gomin swamp. Very common, by beating off blue-berry blossom.

Chelymorpha argus, Licht. Conspicuous, hibernating in dead leaves spring and fall.

Phellopsis obcordata, Kirby. May 8. St. Romauld's. Seven taken from under bark of rotten stump. May 18. One example at Gaspé Basin.

Cephaloon lepturoides, Newm. June 11. Abundant by beating off blossom of wild black cherry, woods near St. David's.

Schizotus cervicalis, Newm. (One.) June 11.

Pomphopœa Sayi, Lec. June 11. Woods near St. David's. Several off blossoms of wild black cherry (*Prunus serotina*, Ehrhart.) June 12. One on wing, Isle d'Orleans.

Hormorus undulatus, Uhler. June 11. Woods near St. David's. One specimen off blossom of choke-berry (*Pirus arbutifolia*).

Otiorhynchus rugifrons, Gyll. May 20. Gaspé. Hibernating.

Phytonomus nigrirostris, Fab. (One.) May 18. Gomin swamp Beating off blue-berry blossom. Also found hibernating.

Macrops sparsus, Say. May 20. Gaspé. Hibernating.

ON THE GEOGRAPHICAL DISTRIBUTION OF SOME COMMON SCALE INSECTS.

BY L. O. HOWARD, WASHINGTON, D. C.

Owing to the extensive commerce in nursery stock and fruits, which has been carried on all over the world for many years, it has become a matter of very considerable difficulty to form any adequate idea of the original Coccid fauna of any given part of the globe. Restriction of the importation of diseased nursery stock and fruit is new, and for years plants and fruit, carrying thousands of scale insects, have been landed almost daily at most large seaports. It is, however, not too late to ascertain many facts of importance, and since the apparent confusion is growing worse day by day, it becomes necessary to make an immediate endeavour not only to ascertain the original home of all species of economic importance, but to place on record all the facts which can be ascertained regarding their spread down to the present time. Many injurious species are still more or less restricted, and the necessity for quarantine laws is as great as it has ever been. If horticulturists will not demand, for their own personal good, a clean bill of health from dealers from whom they purchase plants, it behoves local and State governments to pass such regulations as will effectually prohibit the introduction of new insect enemies, particularly of this class of scale insects.

To point this moral to which I have more particularly referred in No. 3 of Vol. VII. of Insect Life, we have only to glance at the history of several prominent orchard scales, now more or less well-known to most fruit growers.

The Oyster-shell Bark-louse of the Apple (*Mytilaspis pomorum*, Bouché).—This widespread species, now found practically all over the world, so far as our information goes, was apparently originally a European species, at least it was known to European entomologists in the early part of the eighteenth century. At the present day it occurs abundantly throughout the United States and Canada, with the exception of the far south-west. It was imported into the New England colonies at some time during the last century. The first American account of the insect was written by Mr. Enoch Perley, of Bridgeport, Maine, in 1794. By 1835 it had spread through New England; in 1854 it was already abundant throughout New York, Pennsylvania and Ohio, and parts of

Wisconsin, but at that date had not penetrated farther west than the districts bordering upon Lake Michigan. It reached northern Illinois about 1852, and then spread gradually westward and southward, reaching the Mississippi River in the early '60's. In 1868 it had invaded Iowa and Northern Missouri; in 1872 it had extended south from Missouri into Mississippi and had made sporadic appearances in Georgia, towards which point it had, in the meantime, been spreading down the Atlantic coast. In 1872 it had also made its appearance in Eastern Kansas, and since that date it has appeared in Washington, Oregon and British Columbia, south to some extent in California, and in several of the fruit-growing regions of Colorado and Nebraska. At the present time it is seen in Nebraska, and is not known, so far as our information goes, in Louisiana and New Mexico.

Can Canadian entomologists trace its spread through the Dominion?

The Scurfy Bark-louse (*Chionaspis furfurus*, Fitch).—Unlike the preceding species, the scurfy bark-louse is a native of America. It occurs from Maine to Nebraska, through all the northern States, and south nearly to the Gulf of Mexico. Recently it has been imported into England on currant bushes from America. It is a hardy species, but coming into more or less direct competition with the oyster-shell bark-louse, it has, in many localities, been supplanted by the latter. Does this insect occur abundantly in Canada, and what is its Canadian distribution?

The Greedy Scale (*Aspidiotus camelliæ*, Sign.).—From our present information, it seems probable that this insect is indigenous to Southern Europe. It is known also in New Zealand, Australia and the Sandwich Islands, into which countries it was probably imported directly or indirectly from South Europe. In the United States it was first found in California, where it was probably introduced from Australia, and where it was first known in the vicinity of Santa Barbara, from which point it has spread north to Washington, and south to Mexico. From California it has been introduced into New Mexico. It is also found occasionally on hot-house plants in the north-eastern States, and rarely out of doors in Florida. In the latter State it has been found upon one food-plant only, and it is impossible to surmise whether this is the result of a direct importation from California or from Europe.

The so-called English Walnut Scale (*Aspidiotus juglans-regiæ*, Comstock) —For all we know to the contrary, this species is indigenous to the United States. It occurs in California, New Mexico, Florida, Texas,

Louisiana, Mississippi, District of Columbia and New York. In its more northern localities it is scarce. In the south, where attention has only recently been drawn to its injuries, it multiplies rapidly, and becomes a serious enemy to the peach and pear.

The New Peach Scale (*Diaspis lanatus*, Morgan & Cockerell).—This species seems to be indigenous to the West Indies, where it has been found in Jamaica, Trinidad, Martinique, Barbadoes, Santo Domingo and Grand Cayman. In the West Indies it occurs upon a great variety of food-plants. In Ceylon it has been found to affect cultivated geranium plants. In the United States, it is now known in one locality in Florida, another in Georgia, and in the District of Columbia, doing very considerable damage in each of these localities to peach trees. Its introduction from the West Indies into the United States is apparently rather recent.

The San José or Pernicious Scale (*Aspidiotus perniciosus*, Comstock).—This insect is known positively to occur in Australia, Chili and Hawaii, outside of the United States. In the United States it made its first appearance rather more than twenty years ago in the vicinity of San José, Cal. It was probably introduced at that point through importations of fruit trees and shrubs made by Mr. James Lick. Its original home is not yet known. The supposition that it is a Chilian insect, originally made by Mr. Alexander Crow, seems negatived by recent evidence, and it is probable that it reached Chili from the United States. It spread through California, reaching British Columbia within the last two years, and spreading eastward, it reached Idaho on the north, and Nevada, Arizona and New Mexico on the south, also within the last few years. A chance importation of California nursery stock has also established it at one point in Missouri, one in Florida, one in Virginia, one in Indiana, three in Maryland, two in Pennsylvania, one in New York State proper, and several in Long Island, and many in New Jersey.

The Red Scale of Florida (*Aspidiotus ficus*, Ashmead).—This scale is probably of West Indian or South American origin. For many years in the United States it was known only in the State of Florida, where it was introduced first into an orange grove near Orlando upon a sour orange tree brought from Havana, Cuba. Investigations made by Comstock in 1880 showed that it was an abundant species in the public gardens of the City of Havana. From the introduction at Orlando, the species spread rapidly through the orange-growing regions of Florida. Until recently it was supposed to have been introduced into Louisiana during the New

Orleans cotton exposition of 1884–5, but late investigations by Professor Morgan show that it is most prevalent in an orchard into which citrus plants from Brazil have been introduced, and that from this nursery nearly all the orange plants in the City of New Orleans have been sent out. This indicates a South American introduction into Louisiana independent of the West Indian introduction into Florida. Late advices show that it has established itself at Galveston Island, Texas. We have also seen specimens from Tampico, Mexico.

STAPHYLINUS CÆSAREUS, CEDERH., AND S. ERYTHROPTERUS, LINN., IN CANADA.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

Staphylinus erythropterus, Linn. This beetle has been but once recorded in America, the specimen being noted from Detroit. I have now to record it as inhabiting this section of Canada, and, at the same time, to correct an error which has been put in circulation through my agency. When Dr. LeConte visited me in July, 1883, he named a beetle for me as *S. cæsareus*, Cederh. (*ornaticauda*, Lec.), remarking that it has only once been found in America. The species was, therefore, inserted in my list of Ottawa Coleoptera (Ott. Field. Nat. Club, Trans.,vii., p. 191), and in my Additions to Canadian Lists of Coleoptera (Can. Ent. xvi., p. 46). These records are quoted by Dr. Hamilton in his catalogue of the Coleoptera common to North America, Northern Asia and Europe. The capture of examples of *S. badius* (not on my list) proved to me that a slip had been made by Dr. LeConte (his examination of my collection having necessarily been hurried), and that the insect labelled *cæsareus* was only really *badipes*. I, therefore, determined to strike the name off my list, and to take the first opportunity of correcting the error, but soon after, by a curious coincidence, I found (Apl. 23rd, 1892) under a stone at the margin of a swamp a Staphylinus, which seemed to be a genuine *cæsareus*. My determination was made by Dr. Horn's monograph of the genus (Trans. Am. Ent. Soc. vii., p. 191), in which, following the description of the species, he says :—"Easily known from every other species at present occurring in our fauna, by the spots of golden pubescence at the sides of ventral segments above and beneath." On informing Dr. Hamilton of my capture, he kindly sent to me a *cæsareus* from Europe for comparison. This was much larger, and had the elytra more pubescent, and the abdomen more coarsely sculptured and hairy, giving the beetle a coarse

facies. Still, the difference was not nearly so marked as the variations found in many of our beetles, and, relying upon the golden spots upon the abdomen as the test of the species, I remained of opinion that my insect belonged to it.

On October 27th last, Mr. Fletcher and I made a hunt in Dow's Swamp (near the Experimental Farm), on the borders of which I had found the specimen in 1892, and while digging around the roots of trees for such beetles as might have gone into winter quarters, it was my good fortune to obtain two specimens, and around the same stump were taken about a dozen examples of *badipes*. Both specimens when alive showed beautifully the golden spots on the abdomen, but when they were taken out of the bottle of sawdust, in which they were killed, it was found that the spots had mostly been rubbed off. With this new material I was anxious to definitely settle the question of species, and accordingly sent one to Dr. Hamilton, who replied that:—"The insect you sent is a good example of *S. erythropterus*. I have five examples of both *erythropterus* and *cæsareus* from Sweden, and there is no difficulty whatever in the determination by comparison. *Cæsareus* is much larger, and has the thorax and head much more coarsely punctured. The golden abdominal spots are about the same in both, but seemingly more readily lost in *erythropterus*, one half of mine having them about as in yours."

An early fall of snow prevented us from searching for more material until to-day (Nov. 17th), when I spent about two hours carefully searching in the swamp, which was very wet, and more or less covered with snow, and was rewarded by obtaining one specimen, also at the root of a tree under moss, etc., four or five inches beneath the surface.

The American record for *S. erythropterus* will, therefore, rest on the specimen from Detroit, U. S., and my four specimens from Ottawa, Can., the species being apparently able to perpetuate itself in this country, and inhabiting swamps.

The record for *S. cæsareus* will rest on Mr. Ulke's example taken in Canada (locality not quoted), and possibly that specimen, if re-examined, might prove to belong to the preceding species.

I regret that Dr. Hamilton's new edition of his catalogue is printed, and that, therefore, the records therein cannot be amended.

BOOK NOTICES.

THE BUTTERFLY HUNTERS IN THE CARIBBEES, by Dr. Eugene Murray-Aaron. New York, Charles Scribner's Sons, 1894. Pp. 269.

It is a novel event in literature to have a boy's book of adventure written by an Entomologist; we were, therefore, prepared to peruse with interest the volume which Dr. Murray-Aaron has just published. Belonging, perhaps, to those whom he characterizes as the "younger old people," we were charmed beyond measure with the book, and read it through from beginning to end with as much avidity and enjoyment as any adventure-loving school-boy. It relates in pleasant, easy style, the expedition made by a couple of boys, under the guidance of their naturalist friend, "the Doctor." During the early winter months they visited several of the islands of the Bahamas, and then made a more venturesome excursion across Haiti and into Santo Domingo, winding up with a flying visit to Jamaica. Their object was to collect butterflies especially, and at the same time to gather all the animal and vegetable curiosities that they conveniently could. For an account of their success and the various "dodges" they had recourse to, especially when in pursuit of *Papilio Homerus*, we must refer the reader to the book itself. It is not, however, a mere record of the doings of collectors; a great deal of interesting information is given regarding the condition of the negro races in their barbarism where left to themselves, and their happy condition when under British rule. Much pleasant instruction may also be gained regarding the geography, scenery and government of the various islands that were visited. If any paterfamilias is looking for a book to put in his boy's Christmas stocking, he cannot do better than purchase a copy of this. If his boy has any taste for Natural History, it will delight him beyond measure. The book is handsomely printed and bound, and illustrated with several well-executed plates. The entomologist may be disappointed at the absence of lists, or names of species, and pictures of butterflies; but the book is not meant for a scientific treatise, though its statements may be relied upon as strictly accurate, the author being well-known as the Editor for a time of *Papilio*, and Curator of the American Entomological Society, at Philadelphia, as well as a valued contributor to this magazine.

THE BUTTERFLIES OF NORTH AMERICA, by W. H. Edwards. Third Series, Part XV.

This part, like its immediate predecessor, is of especial interest to Canadian Entomologists, as it is chiefly devoted to the illustration of some of our most interesting species of butterflies, and more than maintains the very high standard of excellence to which Mr. Edwards has accustomed us. The first plate is devoted to two rare species of Argynnis from the Rocky Mountains of Alberta, the first being *Astarte*, for so many years practically unknown, save to those having access to the type in the British Museum, the locality whence it was received being even in doubt. True, it had been figured as to its upper side, in Doubleday, Hewitson & Westwood's great work "The Genera of Diurnal Lepidoptera," but that was not sufficient to identify it, so when it was re-discoveerd by Mr. Thomas E. Bean on the mountain summits near Laggan, it was very naturally re-described, or rather re-named, by Mr. Edwards, as *Argynnis Victoria*. The species is quite unlike any other North American species of this genus, and Mr. Bean's notes on its habits are very interesting. There is a slight clerical error in the reference to the plate in Doubleday's work, as it should be 23 instead of 53, as given by Mr. Edwards at the head of his article. The second species treated of is *A. Alberta*, a most distinct and interesting species belonging to the *Chariclea* sub-group, which also was discovered by Mr. Bean on the mountains near Laggan, in 1888. The sexes differ considerably in colour, and so far as known the imago only appears every second season, being found in the even numbered years.

The second plate is devoted chiefly to another butterfly discovered by Mr. Bean at Laggan, a species of *Chionobas*, which Mr. Edwards regards as identical with *C. Subhyalina*, Curtis, described in the Appendix to Ross's Narrative of his Second Voyage, the solitary type of which was taken in Boothia Felix. This identification, however, not being altogether satisfactory, and the species having been described by Mr. Elwes in the Trans. Ent. Soc., London, as *C. Beanii*, it will doubtless be known by the latter name.

In connection with this, it may be mentioned that the specimens in the British Museum collection, under the name *Subhyalina* are different from the form from Laggan, and seem to agree more closely with Curtis's description. A specimen from Hudson's Straits similar to those

in the B. M. is also in my collection. The other species figured on this plate is *Chionobas Norna*, well-known in Scandinavia, but of which Mr. Edwards has received several female examples from Alaska.

The male from Finland figured on the plate is certainly very different from the figure of that sex in Boisduval's "Icones," and the male is assuredly sometimes of the same type as the female, as shown by specimens from Norway in my collection.

The third plate of this magnificent part is an exceedingly fine one, crowded with figures illustrating *C. Semidea* from the White Mountains, Pike's Peak and Hudson's Strait.

The egg, young larva, larva after 1st moult and mature, and the chrysalis are fully illustrated.

The letter-press accompanying this plate extends to 11 pages, and is very full and interesting, though the author has apparently overlooked certain facts of interest, especially in connection with the discovery of an egg parasite of the genus Telonomus, as published in the Report of the Ent. Soc., Ontario, for 1892, pp. 32-35.

It is greatly to be hoped that the talented author will be able to carry on the third series of his grand work to twenty parts, as suggested in his "advertisement" to the current volume. H. H. LYMAN.

NORTH AMERICAN HEMIPTERA, by E. P. Van Duzee.

We desire to call the attention of those of our readers who are interested in this order to some recent publications by Mr. Van Duzee, viz., "A List of the Hemiptera of Buffalo and vicinity," and "Descriptions of some new North American Homopterous Insects," which were published in Vol. V., Part 4, of the Bulletin of the Buffalo Society of Natural Sciences; and "A Catalogue of the described Jassoidea of North America," which appeared in the Transactions of the American Entomological Society, Vol. XXI., pp. 245–317 (Philadelphia, July–September, 1894). These papers, which betoken much industry on the part of their able and enthusiastic author, are of especial value, inasmuch as so little work of the kind has been done in most of the families of the order that are found in North America.

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Zygænidæ, new, from Cuba, 334.

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The Canadian Entomologist

VOLUME XXVI.

No. 1.

CATOCALA RELICTA.

EDITED BY

REV. C. J. S. BETHUNE,

PORT HOPE, ONTARIO.

JANUARY, 1894.

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The Canadian Entomologist

VOLUME XXVI.

No. 4.

CATOCALA RELICTA.

EDITED BY

REV. C. J. S. BETHUNE,

PORT HOPE, ONTARIO.

APRIL, 1894.

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No. 8.

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AUGUST, 1894.

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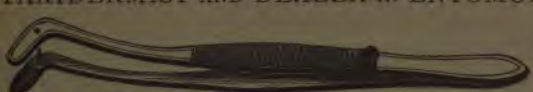

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The Canadian Entomologist

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EDITED BY

REV. C. J. S. BETHUNE,

PORT HOPE, ONTARIO.

DECEMBER, 1894.

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